RocketStor 6422TS

User Manual

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HighPoint Technologies, Inc.

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Notice

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FCC Part 15 Class B Radio Frequency Interference statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment under FCC rules.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

European Union Compliance Statement

This Information Technologies Equipment has been tested and found to comply with the following European directives:

- European Standard EN55022 (1998) Class B
- European Standard EN55024 (1998)

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Product Overview

The RocketStor 6422AS bundle package includes an enclosure for housing your physical drives and a RAID Controller to manage and create RAID arrays of different levels.

- NetStor 2U 8-Bay SAS/SATA JBOD Enclosure
- HighPoint RocketRAID 4522 Controller

Kit Contents

Before getting started, check to see if any items are missing, damaged, or incorrect. For any discrepancy contact your reseller or go to www.highpoint-tech.com for online support.

Item	Count
NetStor NA341A-R Enclosure	1
HighPoint RocketRAID 4522	1
HDD Trays	8
Mini-SAS (SFF-8088) Cable	2
Power Cord	1
NetStor Manual CD-ROM	1
HDD mounting screws	32
HDD lock keys	2

Feature Specifications	RocketStor 6422AS
Form Factor	2U, 8-Bay Rackmount Enclosure
Host Port	2x Mini-SAS
RAID Controller /Bus Interface	RocketRAID 4522 / PCIe 2.0 x8
I/O Storage Processor	RAID-On-Chip Onboard
Onboard Cache	512MB DDR 3 Cache Memory with ECC Protection

RAID Level	0, 1, 5, 6, 10, 50, JBOD
Max. Capacity	Up to 64 TB
Number Of drives	Up to 8
Drive Interface	SAS, SATA
Drive Form Factor	3.5" & 2.5"
Chassis Material	Heavy-duty cold-rolled steel housing
Dimension	18(D)×19(W)×3.5(H) inches
Weight	37.43 lbs.
Warranty	2 Years
UPC	643653642212
Advanced RAID Features	Configurable RAID Block Size up to 1MB
	Flash ROM for Upgradeable Firmware
	DV Mode Technology
	Storage Health Inspector
	Redundant RAID Configurations
	BIOS PnP (plug and play) and BBS (BIOS boot specification) support
	Bootable RAID Array
	EFI BIOS for Mac Platform
	NVRAM for Write Journaling
	Battery Backup unit retains data when power outage occurs
	Multiple RAID Partitions supported
	Online Array Roaming
	Online RAID Level Migration (ORLM)
	Online Capacity Expansion (OCE)
	RAID Initialization Background/Foreground/Quick
	Global Hot Spare Disk support
	Automatic and configurable RAID Rebuilding Priority
	Disk Format compatible: 512, 512e, 4Kn
	Larger than 2 TB Drive and RAID Array support
	Spin down Massive Arrays of Idle Disks support
	Native Command Queuing
	Staggered Drive Spin Up
	Write Back and Write Through
Storage Monitoring and Management Suite	
RAID Management Suites:	BIOS/Firmware configuration tool, Browser-Based management tool CLI (Command Line Interface) - scriptable configuration tool, API package
SMTP	Email Alert notification
Cooling Fan:	Two 60×60×25 mm
Power Supply	Redundant 400 W 100-240 V AC, 50/60 Hz universal
LED Display for Each Tray	White - Power-On Indicator / Blue -Busy (HDD Access) Indicator
LED Display For Enclosure	POWER on LED (white / FAN normal – green; fail – red) / TEMP(normal – green; over 55˚C – red)
Alarm Buzzer	Buzzer beeping for Fan Failure or Temperature exceeds 50˚C
Operating System Support	
Windows	Windows / Windows Server
Linux	Linux: RedHat Enterprise, Open SuSE, Fedora Core, Debian, Ubuntu / Linux Driver embedded into Kernel 3.9.4 and later
FreeBSD	Yes
Mac OS X	Mac OS X 10.6 and later (Driver embedded into Mac OS X 10.9 and later)

Operating Environment	
Temperature	(operating) 5˚C – 45˚C (non-operating) -40˚C – 65˚C
Relative Humidity	(operating) 8% – 90% RH (Non-condensing) (non-operating) 5% – 95% RH (Non-condensing)
Certification	CE, FCC, RoHS

Section 1: Hardware Installation

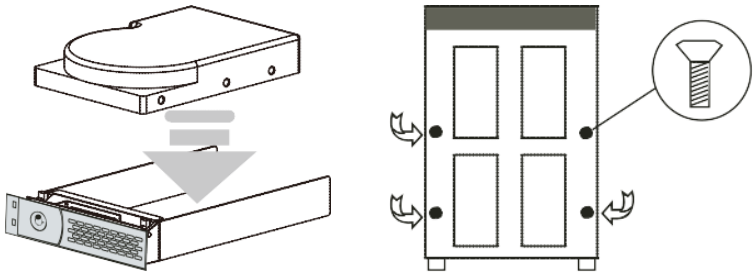
This section covers the following topics:

1. Setting up the Enclosure
2. Setting up the HBA (**H**ost **B**us **A**dapter)
3. LED Activity

Preparing the Enclosure

You can refer to the NetStor 2U 8-Bay Rackmount Quick Installation Guide for details on how to set up the enclosure.

1. Take out the HDD tray and place your hard drive in the tray as shown below. Then install the tray back into the enclosure. Repeat for all your hard drives.



2. Optional) Lock your HDD tray with the included disk tray key.
3. Place the enclosure on a server rack or another stable, flat surface.
4. Connect the enclosure to a power source with the AC Power Cord.
5. Connect the enclosure to the included RocketRAID 4522 using the mini-SAS to mini-SAS cable (SFF-8088).

Preparing the HBA (Host Bus Adapter)

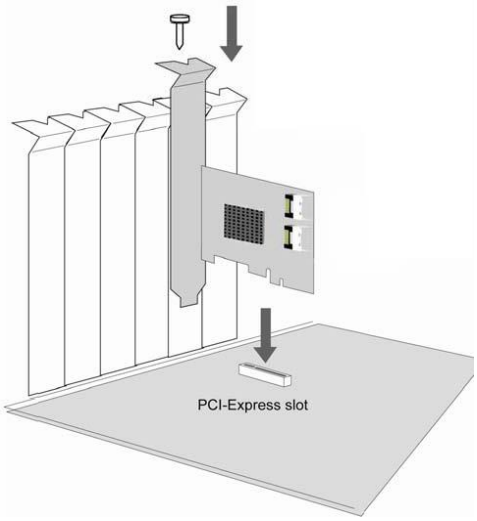
The following instructions describe how to prepare your RocketRAID 4522 HBA for use.

To install your RocketRAID 4522:

Important: Before installing the RocketRAID 4522 Controller, ensure that your system is powered OFF.

1. Locate a PCIe 2.0 x8 slot (or compatible slot) on your PC motherboard.
    - Note 1: Refer to your PC manual for instructions on how to access your motherboard.
    - Note 2: Refer to your motherboard manual for instructions on how to locate your PCI Express slot.
2. Align the RocketRAID 4522 with the PCIe slot and push straight down until card is fully seated.
3. Tighten the connection by fastening the RocketRAID bracket and enclosure together.

A PCI-Express 2.0 x8 card is compatible with PCI-Express 2.0 x16 and PCI-Express 3.0 x16 slots.



Connecting the HBA with the Enclosure

Figure 1. Enclosure Front Panel

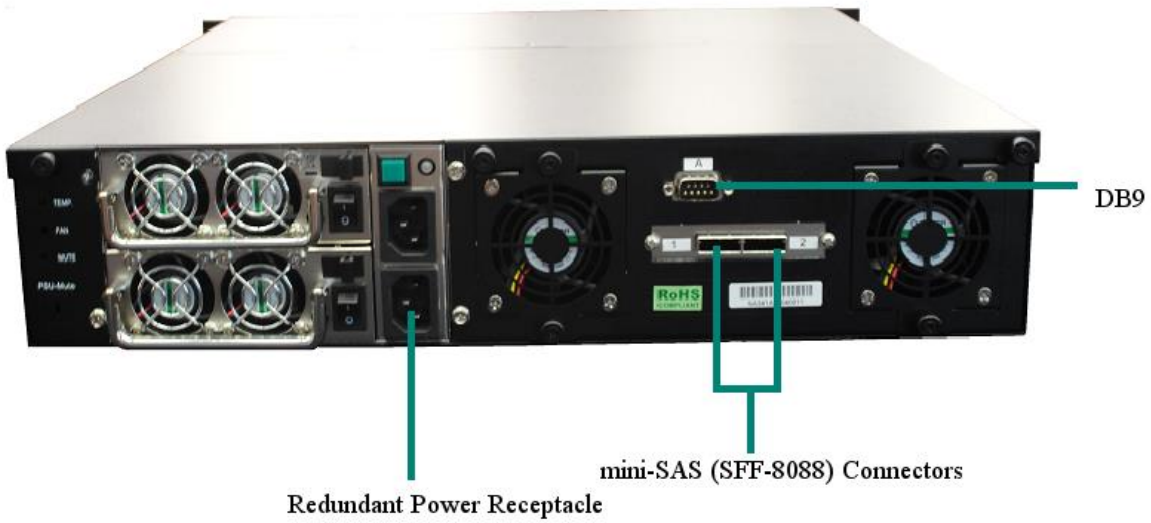


Figure 2. Enclosure Back Panel

Key			
1	HDD Power LED	**5**	Temperature LED GREEN- normal temperatures RED – over 55°C
2	HDD Status LED	**6**	Power Cord Receptacle
3	Mute Button : Resets alarm	**7**	dual mini-SAS (SFF-8088) Connectors
4	FAN Status LED: GREEN – normal status RED – FAIL status	**8**	DB9 Connector (Connecting SGPIO signal for HDD fail display)

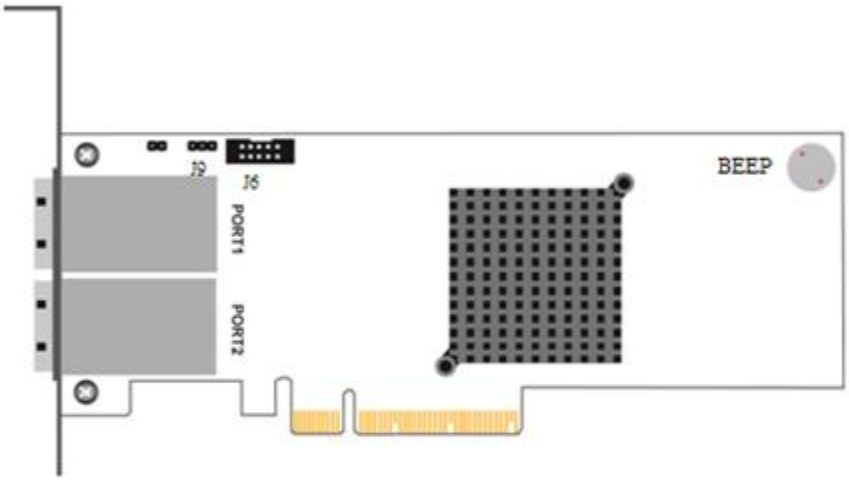
Use the mini-SAS (SFF-8088) cables provided to connect the enclosure ports to the RocketRAID ports.

LED Activity

The following information tells you how to interpret LED activity seen on the enclosure and disk trays.

	Present	Active	Failed	Identify
Disk Tray	WHITE	BLUE	N/A	N/A
Enclosure LEDs	WHITE		N/A	N/A
Fans LEDs		GREEN	RED	N/A
Temperature LEDs		GREEN	RED	N/A

Present – Indicates that the disk is present and available.
Active – Indicates the disk is performing disk I/O
Failed – Indicates disk failure **(Not available for RS6422AS enclosure)**
Identify – Identify LED is a setting that can be enabled in Physical > devices. This setting will bring up a RED LED for the drive that is enabled for easy identification.
Identify LEDs are not available on the RS6422AS enclosure.



RocketRAID 4522 Key	
PORT1	mini-SAS (SFF-8088) Connection Corresponds to channel 1-4
PORT2	mini-SAS (SFF-8088) Connection Corresponds to channel 5-8
BEEP	Alarm/Beeper
J9	I2C Connector
J6	Battery Backup Unit (BBU) Connector

Section 2: Drivers

This section covers the following topics:

- Installing drivers on your Operating System
- Verifying driver installation
- Loading drivers on a bootable array
- Updating drivers
- Uninstalling drivers

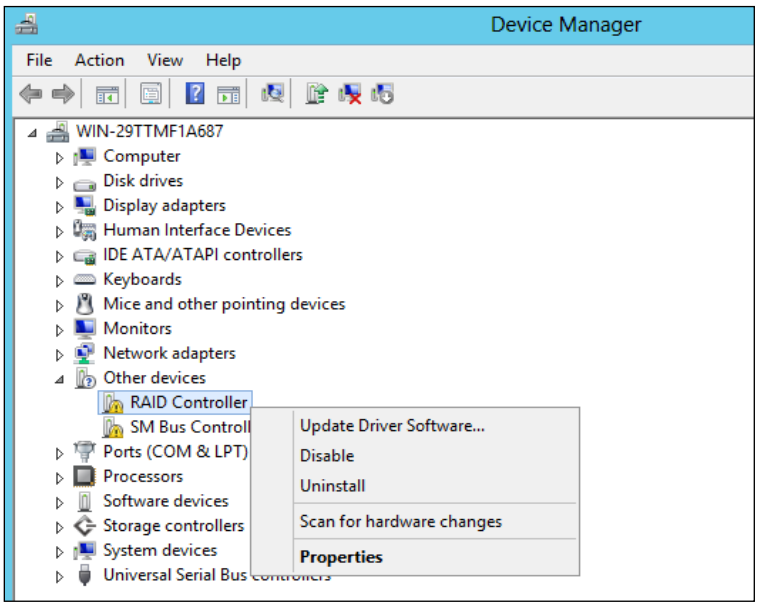
Installing Drivers on an Existing Operating System

Drivers provide a way for your operating system to communicate with your new hardware. Updating to the latest drivers ensures your product has the latest performance, stability, and compatibility improvements. Drivers are updated regularly at www.highpoint-tech.com

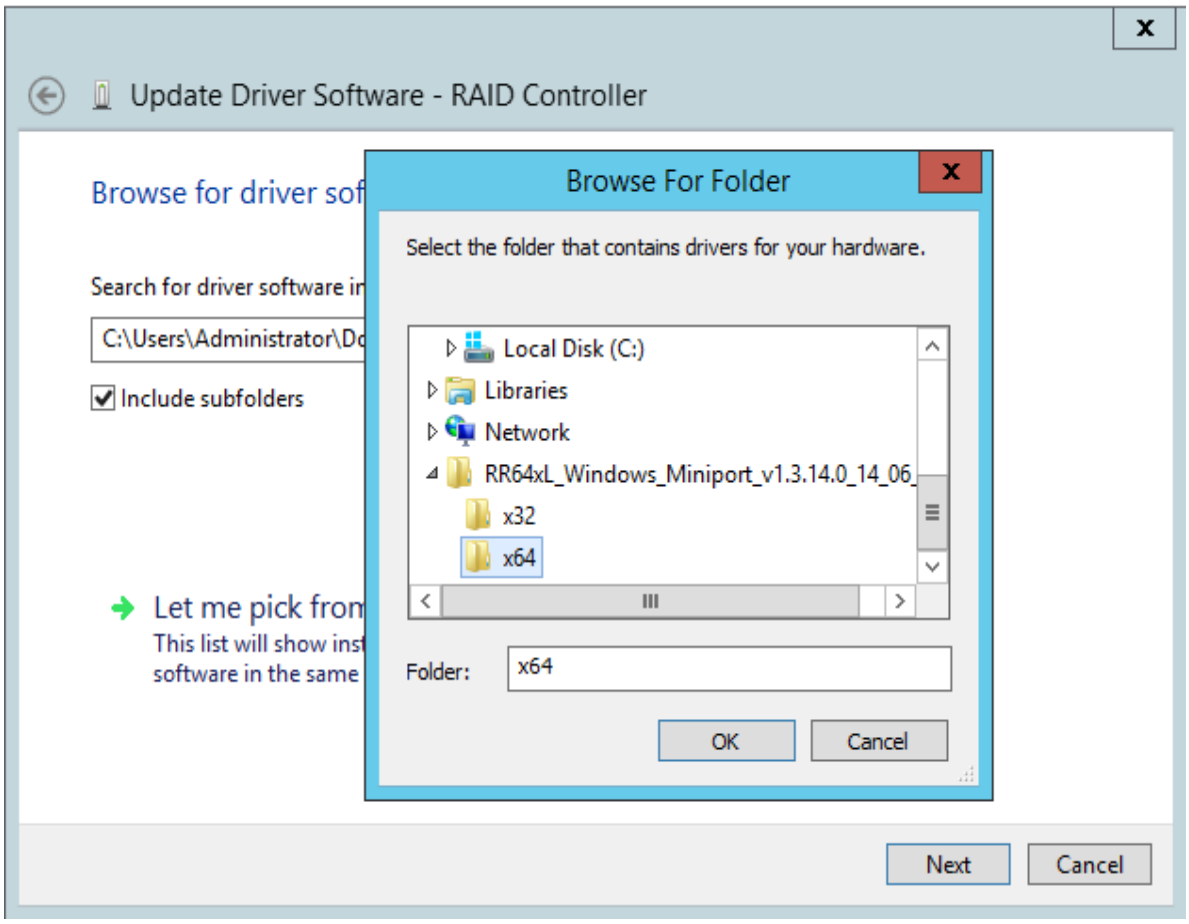
For **Windows** Users:

1. Obtain latest driver software for RocketRAID 4522 Controller from our website www.highpoint-tech.com
2. Take note the location you downloaded the driver file to, then open Windows **Device Manager**.
   - Click **Start**
   - Click **Control Panel**
   - Click **Hardware and Sound**
   - Under **Devices and Printer**, Click **Device Manager**
   - ***Note***: Alternatively, you can search **Device Manager** in your start menu search bar.

3. Under **Other Devices**, right click on **RAID controller**



4. On the drop down menu, click **Update Driver Software**…
5. When prompted, select **Browse my computer for driver software**

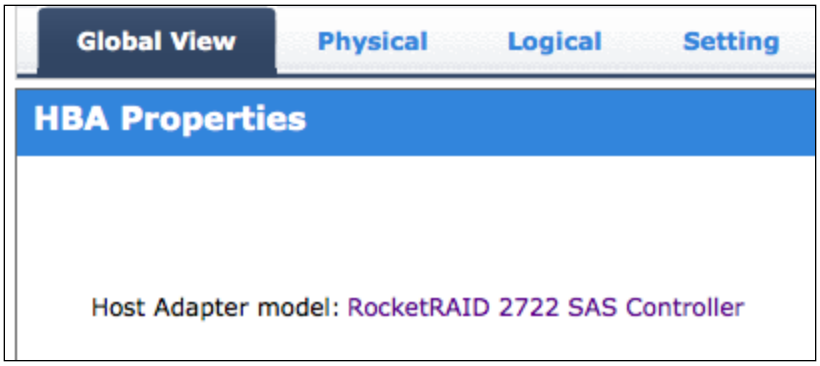


6. Locate the driver files you downloaded and select them.
7. Press **next** and follow the on screen instructions
8. **Reboot**

For **Mac** Users:

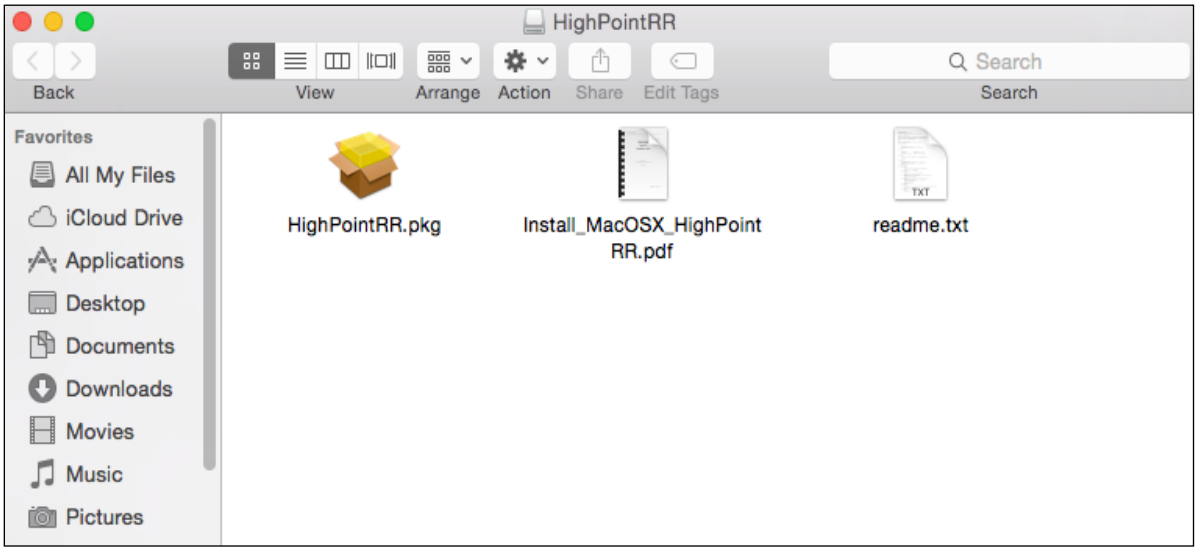
HighPoint Mac Drivers have file extension **.dmg**; make sure the file extension for the files you downloaded are the same.

1. Obtain latest driver online at www.hptmac.com
   - Navigate to your specific HBA controller page (Refer to **How to View HBA Properties** to find model name)

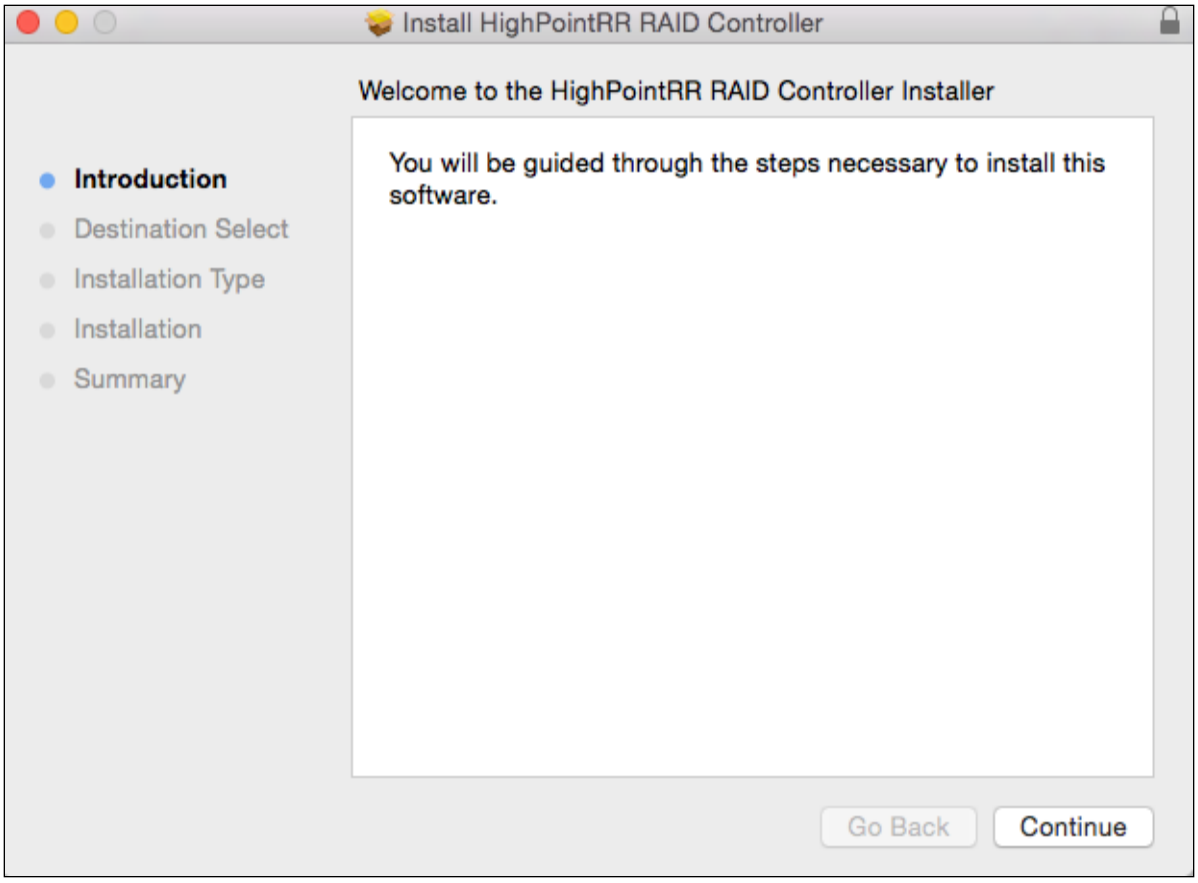


2. Once downloaded, locate the folder you downloaded the driver to and double click on the file named “HighPointRR_###.dmg” ***Note:*** File name varies, but extension is **.dmg**.

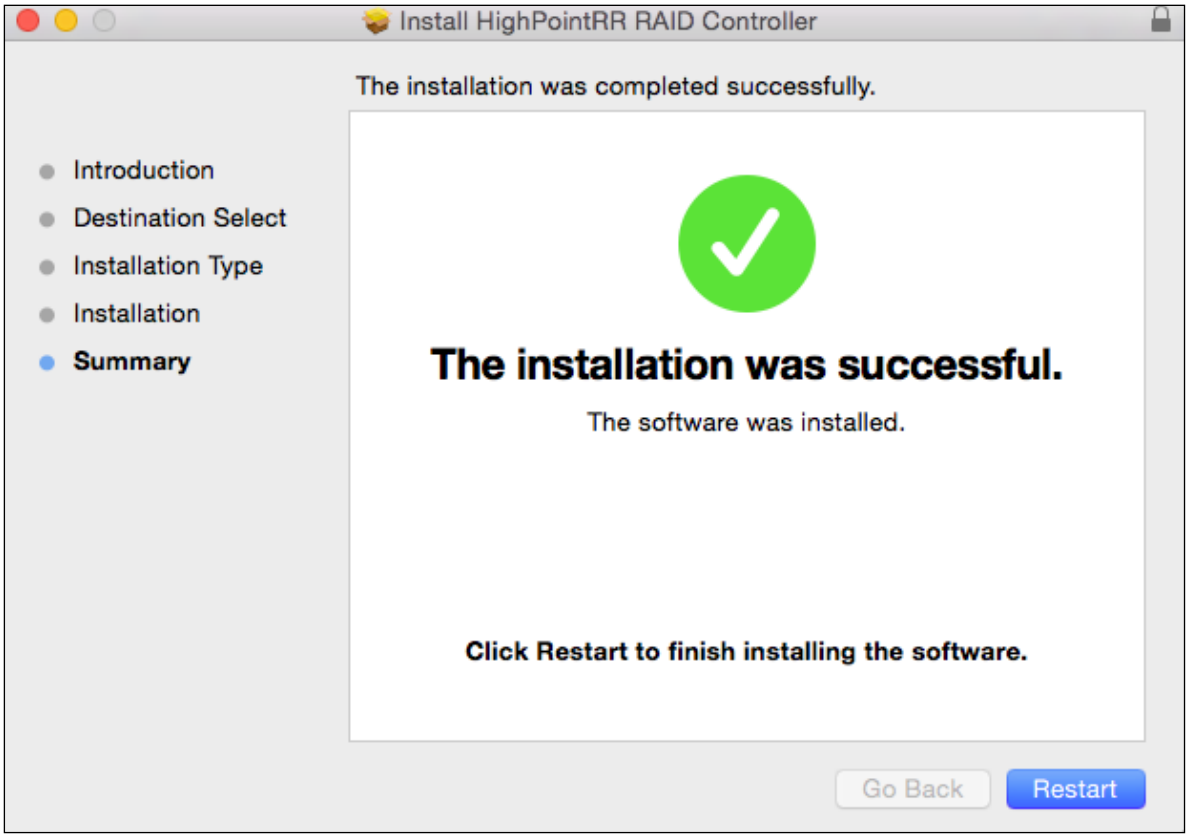
3. The file will be mounted onto the operating system, click on **HighPointRR.pkg** located on the mounted drive.



4. Follow the on-screen instructions.



5. **Reboot** computer



6. Make sure **Driver Installed** is **Yes**

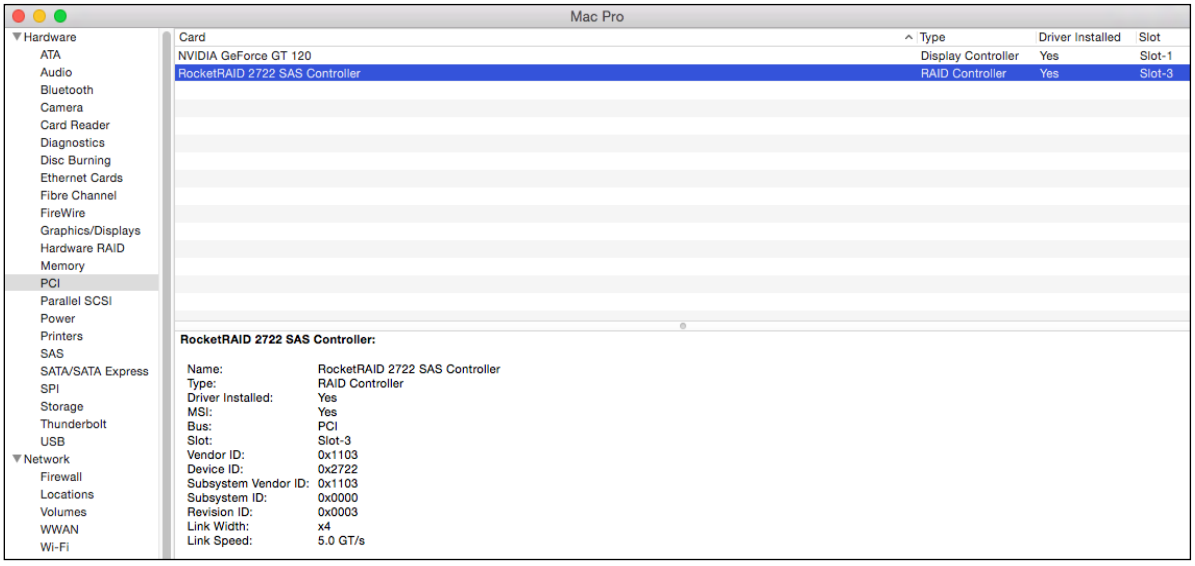


Figure 3. Click Apple Icon > About this Mac... > System Report > PCI

For **Linux** and **FreeBSD** users:

Refer to the **Driver Installation Guide** and **README** files in each driver package for steps to install.

The latest drivers can be found at www.highpoint-tech.com

Checking your Driver Version

To check if the driver was installed successfully follow the instructions below. The same procedure can be used to determine your driver version.

For **Windows** Users:

1. Click **Start**
2. Click **Control Panel**
3. Click **Hardware and Sound**
4. Under **Devices and Printer**, Click **Device Manager**
   Note: Alternatively, you can search Device Manager in your start menu search bar.
5. Click the **Storage controllers** tab
   - If driver is installed it will show **RocketRAID 4522 Controller,**
   - If driver is *not* installed it will be located in **Other devices** as **RAID Controller**
   - Click **Properties**, then click the **Driver** Tab to find out the version installed.

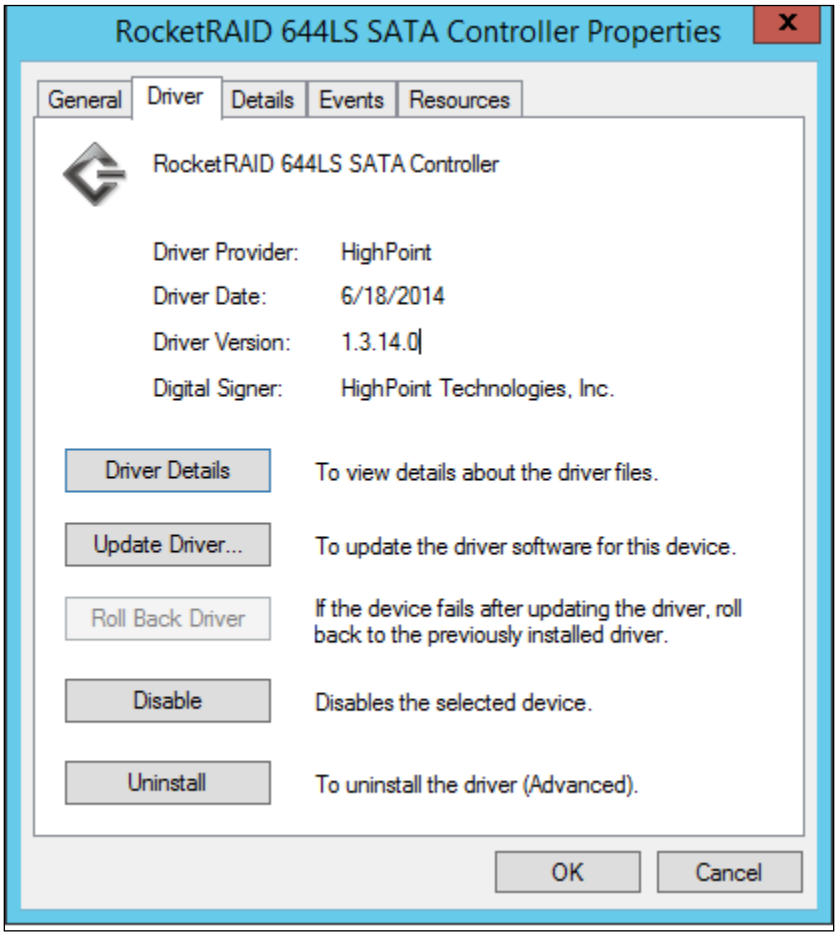


Figure 4. Driver version 1.3.14.0 for a RocketRAID 644LS

For **Mac** Users:

1. Click on the Apple Icon ( )
2. Click **About this Mac**
3. Click **More Info**
4. Click **System Report**

5. Select **PCI Cards**

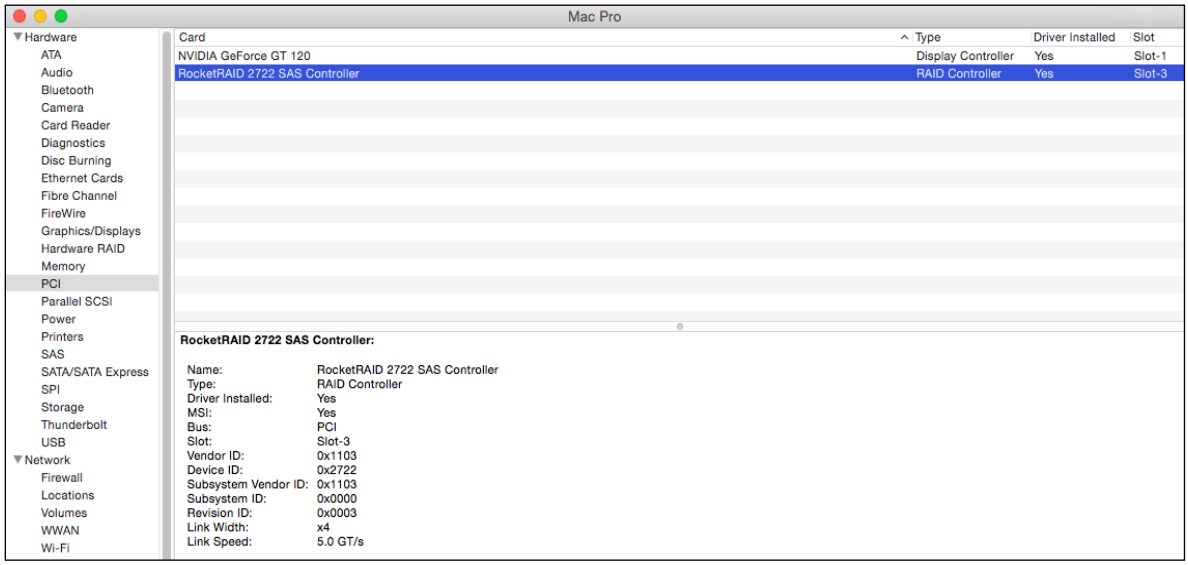


Figure 5. Navigate to Apple Icon > About this Mac > System Report > PCI

Loading the Drivers onto a Bootable Array

Creating an array and then installing Windows OS onto the RAID configuration is a bootable array. Since you cannot use the conventional method of installing drivers, the drive must be loaded during Windows installation.

For **Windows** Users:

1. On first boot-up, press **CTRL** + **H** during the HighPoint RocketRAID splash screen to enter the BIOS RAID creation utility.
2. Create the array you want to install your Windows Operating System onto
3. With the array created, download the RS6422AS drivers from www.highpoint-tech.com and load them onto a **USB**. You will need to locate the files when prompted to load drivers during Windows Installation
4. Start Windows Installation.
5. When prompted **Where do you want to install Windows**? Click **Load Driver**
6. When prompted, click **Browse**
7. Browse to your connected USB and driver files you downloaded
8. Click **OK**, and once loaded, you will see a list of drivers detected.
9. Select the HighPoint driver file
10. Click **Next**, and you should see the RAID arrays you created
11. Select the RAID array and click next
12. Follow the Windows installation instructions to complete your installation

A bootable array differs for Mac users since there is no way to load the HBA drivers during installation. The only way to create a bootable array would be to use 3rd party software, and clone the bootable drive.

For **Mac** Users:

1. You must have an existing installation of the Mac operating system installed.
2. Set up the RS6422AS normally by
   - Setting up the hardware ()
   - Installing HighPoint RocketRAID 4522 driver and WebGUI
   - Creating an Array using the WebGUI
3. Once an array is created, the logical volume can be seen by your operating system
4. Use a 3rd party disk cloning tool to copy your bootable drive onto the logical drive you just created.

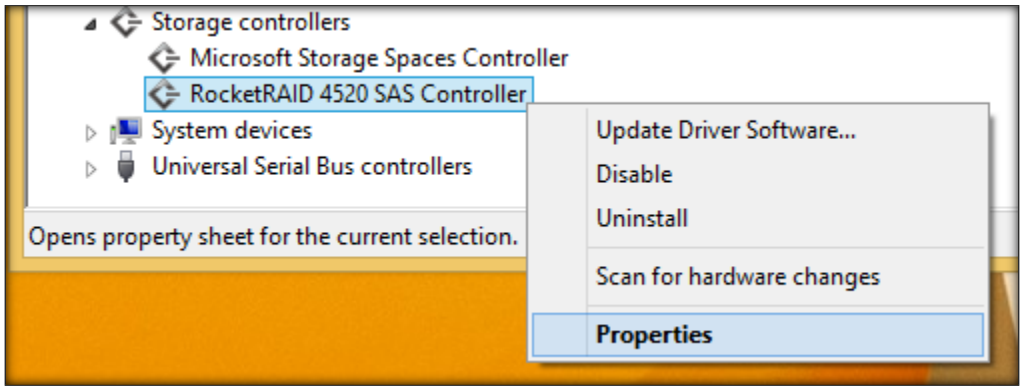
Updating the Drivers

For **Windows** Users:

1. Obtain the latest driver files for **RocketRAID 4522** from www.highpoint-tech.com
2. Open Windows **Device Manager**
   - Click **Start**
   - Click **Control Panel**

- Click **Hardware and Sound**
- Under **Devices and Printer**, Click **Device Manager**
- ***Note***: Alternatively, you can search Device Manager in your start menu search bar.

3. Click the **Storage controllers** tab
4. Right click **RocketRAID** 4522 **Controller**



5. Click **Update Driver Software**…
6. Click **Browse my computer for driver software**
7. Select the driver files you downloaded
8. Click **next**
9. **Reboot**

Uninstalling the Drivers

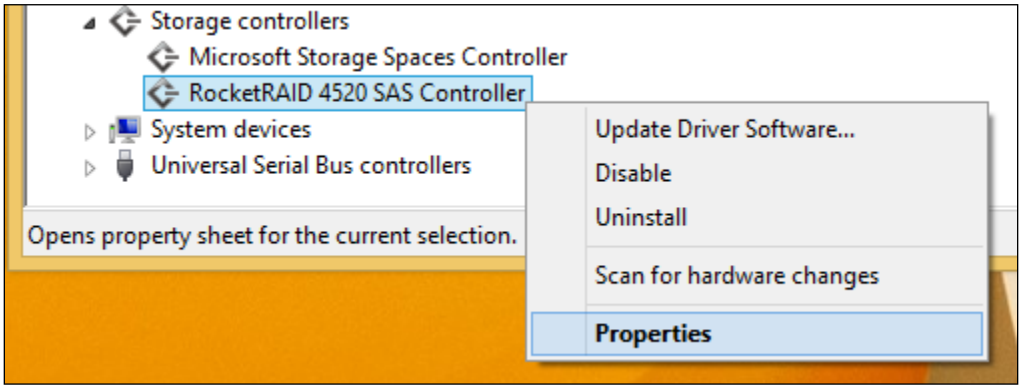
For **Mac** Platform:

1. Double click on "HighPointIOP_Mac_106_####.dmg" **Note**: File name subject to change, make sure extension is **.dmg**.
2. Double click on **uninstall.command**
3. A terminal window will pop up prompting you to type in your administrator password. Type in your administrator password to allow uninstall.
4. **Reboot**

Note: The file is flagged as an unidentified developer file on OSX. In order to open, hold the **Control** key + click the file, then click open. A system prompt will appear; read the prompt, then click **open**.

For **Windows** Platform:

1. Open Windows **Device Manager**
   - Click **Start**
   - Click **Control Panel**
   - Click **Hardware and Sound**
   - Under **Devices and Printer**, Click **Device Manager**
   - ***Note***: Alternatively, you can search Device Manager in your start menu search bar.
2. Click the **Storage controllers** tab
3. Right click **RocketRAID 4520 SAS Controller**



4. Click **Uninstall**
5. **Reboot** your PC for changes to take effect

Section 3: Navigating RocketRAID 4522 BIOS Utility (PC only)

HighPoint RocketRAID BIOS utility allows you to create, manage, and maintain your RAID arrays without the need to install HighPoint WebGUI application.

During boot up, you will see a RocketRAID splash screen prompting you to press **CTRL + H** to enter the BIOS. The following keys will help you navigate through the menus, find information, and make adjustments to your RAID arrays.

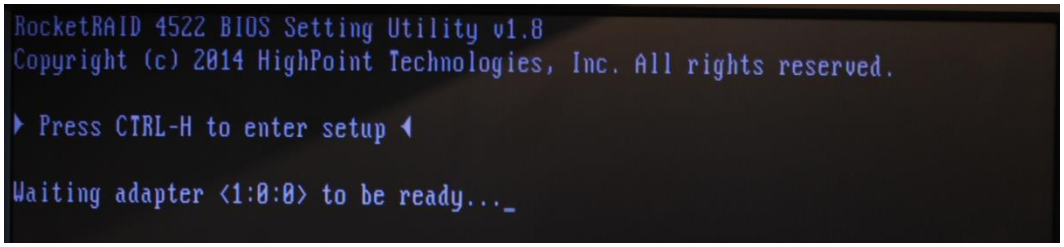

RocketRAID 4522 BIOS Setting Utility v1.8
Copyright (c) 2014 HighPoint Technologies, Inc. All rights reserved.
Press CTRL-H to enter setup
Waiting adapter <1:0:0> to be ready...

Figure 6. RocketRAID Splash Screen. Press CTRL + H to enter BIOS

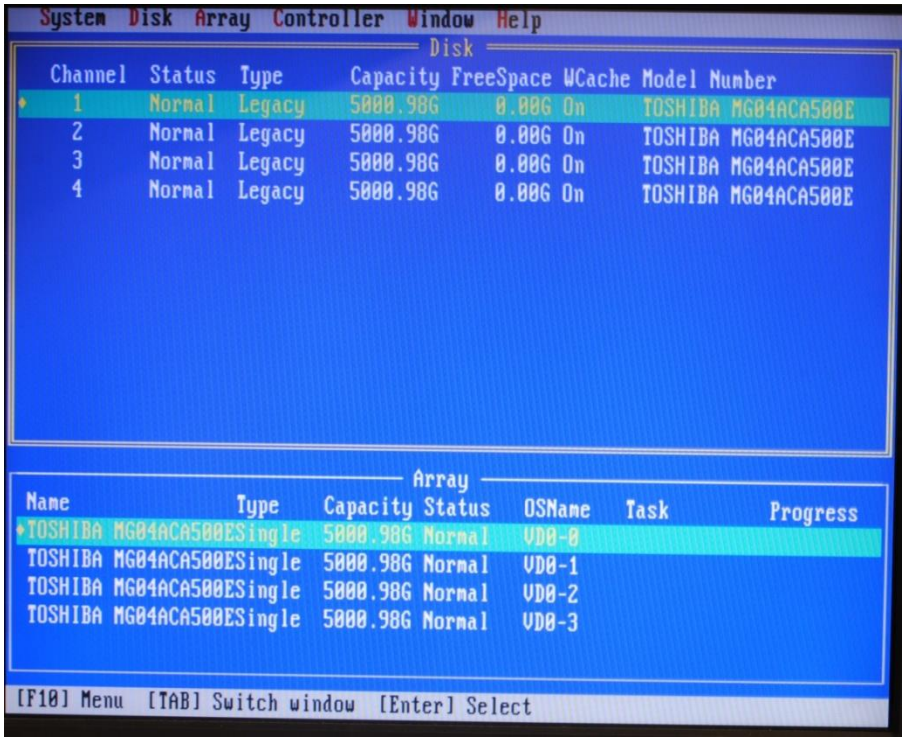

System Disk Array Controller Window Help
Disk
Channel Status Type Capacity FreeSpace WCache Model Number
1 Normal Legacy 5000.98G 0.00G On TOSHIBA MG04ACA500E
2 Normal Legacy 5000.98G 0.00G On TOSHIBA MG04ACA500E
3 Normal Legacy 5000.98G 0.00G On TOSHIBA MG04ACA500E
4 Normal Legacy 5000.98G 0.00G On TOSHIBA MG04ACA500E
Array
Name Type Capacity Status OSName Task Progress
TOSHIBA MG04ACA500E Single 5000.98G Normal VD0-0
TOSHIBA MG04ACA500E Single 5000.98G Normal VD0-1
TOSHIBA MG04ACA500E Single 5000.98G Normal VD0-2
TOSHIBA MG04ACA500E Single 5000.98G Normal VD0-3
[F10] Menu [TAB] Switch window [Enter] Select

Figure 7. Default Screen upon entering BIOS.

Table 1. Navigating the BIOS

Keyboard Arrow Keys	Navigate the menu bar
F10	Accesses the menu bar
TAB	Switches between windows
Enter	Make a selection
ALT + <highlighted key>	Selects Menu Item (Ex. System can be accessed with ALT + S
Spacebar	Make certain selections (eg. creating arrays)
ESC	Exits a selection menu

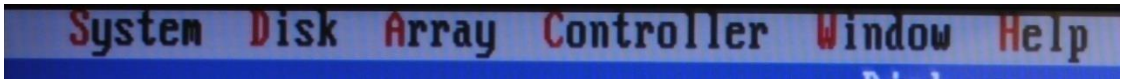


Figure 8. Snapshot of menu bar

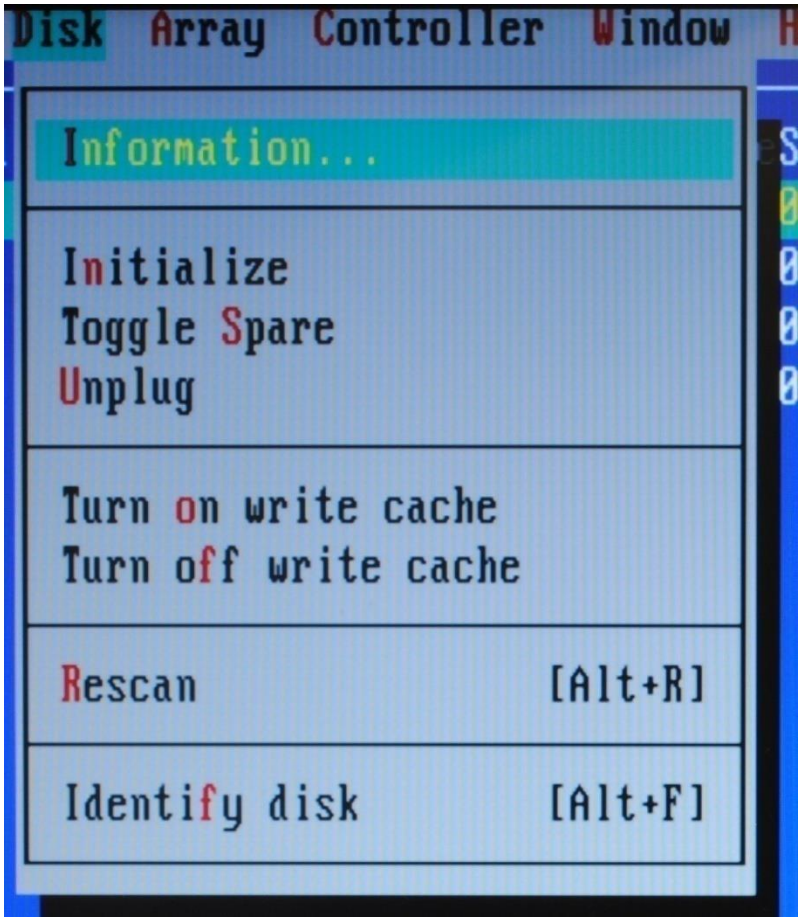
Table 2. Menu Bar Key

System	Exits the BIOS (ALT + X)
Disk	Displays disk Information Initialize disks Add disks to spare pool Unplugs disks
Array	Displays array information Create/delete/unplug arrays Verify array integrity Set boot flag
Controller	Displays RAID controller information Adjust controller settings
Window	View BIOS window panels
Help	www.highpoint-tech.com

System Tab

Press **ALT + X** to exit the BIOS.

Disk Tab



Access disk tab by **navigating** to disk and pressing **enter**, or press **ALT + D**.

Information	Provides physical disk information: • Device Type: SATA or SAS • Model Number • Serial Number • Firmware Revision • Capacity (in sectors) • Read Ahead (on/off) • Write Cache (on/off) • TCQ • NCQ (on/off) • Spin up mode
Initialize	Initializes selected disks
Toggle Spare	Adds selected disks to spare pool

Unplug	Ejects selected disks
Turn on/off write cache	toggles disk write cache ability
Rescan	Triggers motherboard? to rescan
Identify Disk	If applicable, will light up identify LED.

Initializing disks

First you must navigate to the disk panel. By default, you start on the disk panel.

1. Press **ALT + W** to access Window tab
2. Select disk(s)
3. Use keyboard arrow keys to navigate and press **enter** to select desired disk(s)
4. Press **ALT + D** to activate disk tab
5. Select **Initialize**

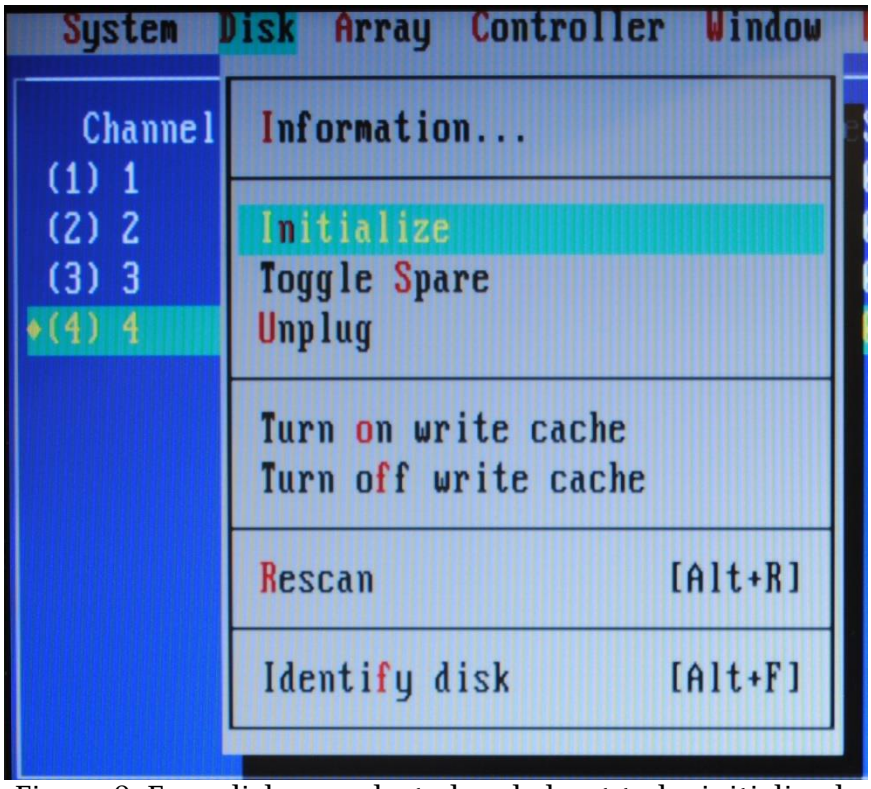


Figure 9. Four disks are slected and about to be initialized.

6. Press **Enter**
7. A prompt will warn you that data will be erased
8. Select **Yes**
9. Once initialized, you can proceed to create an array.

Adding disks to spare pool

1. Navigate to the disk panel (Press **ALT + W**, then press **1**)
2. Use keyboard arrow keys to select desired disk
3. Press **enter** to confirm each selection
4. Press **ALT + D** to open disk tab
5. Select **Toggle Spare**

Unplugging Disks

1. Navigate to the disk panel (Press **ALT + W**, then press **1**)
2. Use the keyboard arrow keys and **Enter** to select desired disks
3. Press **ALT + D** to open disk tab
4. Select **Unplug**

Turn on/off disk write Cache

1. Navigate to the disk panel (Press **ALT + W**, then press **1**)
2. Select desired disks
3. Press **ALT + D** to open disk tab
4. Select Turn on/off write cache

Rescan

Triggers motherboard to rescan the connection

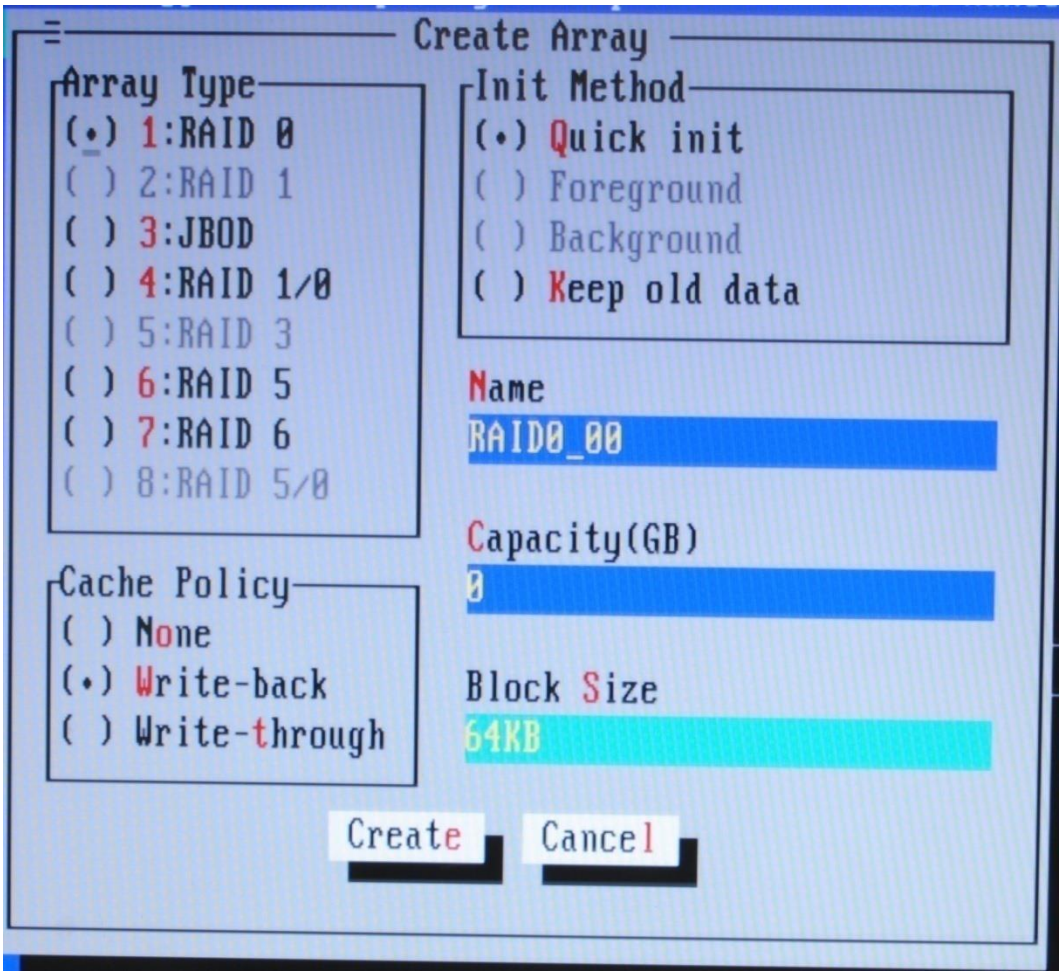
Identify Disk (If applicable)

Each selected disk will light the identify LED.

Array Tab

Array Information	Will disk the following information on selected array: • Array name • RAID type • Cache Policy • Block Size • Sector Size • Disk Members
Create/Delete/Unplug	Selected action will be performed on array
Verify	Initiates verifying array integrity
Start/Stop Task	Starts or stops the verifying/rebuilding process
Set boot	Sets boot flag on array

Creating an Array

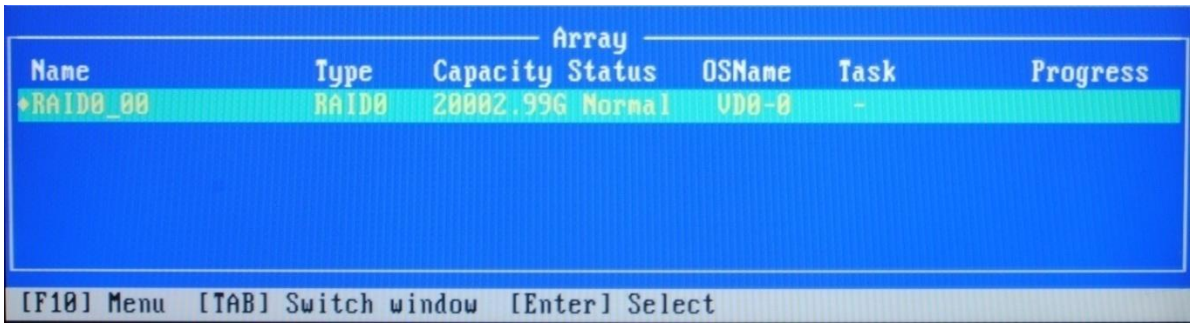


1. Navigate to the disk panel (**ALT + W**, then press **1**)
2. Select each disk you wish to include in your array
3. Press **ALT + A** to open array panel
4. Press **Create**:
5. Press **Spacebar** to navigate and make selections (**TAB** also navigates)

Array Type	Refer to RAID Level Reference Guide for information about different levels. RAID 0, 1, 5, 6, 10, 50, and JBOD
Cache Policy	**Write-back** - Any data written to the array will be stored as cache, resulting in better I/O performance at the risk of data failures due to power outages. Data will be stored as cache before it is physically

	written to the disk; when a power outage occurs, any data in the cache will be lost. **Write-through** - Data written to an array is directly written onto the disk, meaning lower write performance for higher data availability. Without cache acting as a buffer, write performance will be noticeably slower but data loss due to power outages or other failures is significantly minimized.
Init Method	• **Quick Init**- This option grants immediate access to the RAID array by skipping the initialization process, but it will delete all data. **Note***:* Skipping initialization is generally not recommended since residual data on disks may interfere with new data in the future. • **Foreground**- The array initialization process will be set at high priority. During this time array will be non-accessible, but initialization completion time will be shorter. • **Background**- The array initialization process will have a lower priority. During this time array will be accessible, but initialization completion time will be longer. • **Keep Old Data** - This option skips the initialization process and all data on each physical disk of the array will be untouched**.**
Name	Create array name
Capacity	Designate array capacity

6. Press **Create** (**ALT + E**)
7. A prompt about sector size will pop up, **select** a sector size
8. Array will show up in the **array window**


Array
Name Type Capacity Status OSName Task Progress
RAID0_00 RAID0 20002.99G Normal VD0-0 -
[F10] Menu [TAB] Switch window [Enter] Select
Figure 10. Array RAID0_00 has been created.

Verifying your array

1. Navigate to the array panel (Press **ALT + W**, then press **2**)
2. Select desired array to verify (only if you have more than 1 array. If you only have 1 array, verify will automatically start)
3. Press **ALT + A** to open array tab
4. Select **Verify**
5. You can Start/Stop the process by selecting **start/stop task**

Setting Boot Array

1. Navigate to the array panel (Press **ALT + W**, then press **2**)
2. Select desired array
3. Press **ALT + A** to open array tab
4. Press **Set Boot**
5. Window will close, **reboot** to confirm

Controller Tab

Information	Provides certain controller information: • Product ID • PCI Location • IOP Model • SDRAM Size • Firmware Version • Battery Installed • Battery MB Installed • Serial Number • CPU Temperatures (Celcius) • Board Temperature (Celcius) • Controller voltage levels
Setting…	Configures certain settings: • Enable audible alarm • Enable Staggered spin up

	• Spin down idle disk (minutes) • Enable automatic rebuild • Continue Rebuilding on error • INT13 support • Use single BCV entry • Stop on error

Table 3. Controller > Settings Information

Enable Audible Alarm
When a physical disk fails, the controller will emit an audible sound signaling failure. This option enables/disables this sound.

Enable staggered spin up
Staggered Spin up is implemented for users that need to power up multiple Harddrives. Powering on all hard drives simultaneously draws a large electrical load; staggered spin up will power on each hard drive one at a time resulting in a stable, lower current draw.

Enabling this setting will instruct the card to power up the hard disks sequentially (one disk approximately every 2 seconds). Some disks do not support this feature, and it is not recommended to enable this option if that is the case.

Spin down idle disk (minutes)
When set, physical drives will spindown a certain amount of time after disk activity ceases.

Enable Automatic rebuild
When a physical drive fails, the controller will take the drive offline. Once you re-insert or replace the disk, the controller will not automatically rebuild the array unless this option is enabled.

Continue Rebuild on Error
When enabled, the rebuilding process will ignore bad disk sectors and continue rebuilding until completion. When rebuild is finished, the data may be accessible but data inconsistency due to ignored bad sectors may cause problems in the future. If this option is enabled, HighPoint recommends user to check the event log for bad sectors.

Rebuild Priority
You can specify the amount of system resources you want to dedicate to rebuilding the array. There are 5 levels of priority [Lowest, Low, Medium, High, Highest]

Provide INT13 Support
For booting purposes

Use Single BCV Entry
Single booting control vector. If you have more than one bootable HBA enable this option.

Stop on error
If the HBA BIOS finds an error on your hard drive, it will stop the BIOS operation and hang on BIOS screen.

Window Tab

The Window is the default screen you see upon entering the BIOS. The Top panel shows all the physical drives detected, and the bottom panel shows all arrays created.

Maximize	Makes Selected Panel (Disk or Array) fullscreen. You can press TAB to toggle between disks and array panels.
Restore	Restores default panel configuration
1. Disk **2. Array**	Selects the panel you want to work with
Refresh	Refreshes panels

Section 4: BIOS/Firmware Updates

How to Update RocketRAID BIOS/Firmware

There are two ways to update your RocketRAID BIOS/Firmware

1. Using HighPoint WebGUI Update Firmware
2. Using a bootable USB

A few reasons as to why update BIOS/Firmware

BIOS resource issue	Inefficient BIOS code may cause your boot-up to hang during POST.
Compatibility fixes	Updating firmware may fix issues that occur when using later hardware
Bug fixes	Bugs that are discovered post release are fixed in subsequent updates.

Note: It is recommended to update the BIOS through HighPoint WebGUI. (See Installing HighPoint WebGUI)

Having the latest BIOS ensures you have the latest firmware stability and performance improvements. Updating the BIOS may fix boot up or system resource issues; make sure to read the README before making any changes.

Using the WebGUI to update BIOS/Firmware

.

1. Locate the latest firmware on our webpage at www.highpoint-tech.com
2. Example firmware file will be in a zipped package with a naming convention such as RR4522_v###_xxxx.zip (name of file subject to change)
3. Extract the contents of the file
4. Read the readme (if included) to make sure you have the correct firmware for your HBA ***Note***: Your HBA name and properties can be found in the **WebGUI** > **Physical Tab**.
5. Locate the proper BIOS file (eg. 4522bios.blf, refer to the README for accuracy)
6. Log in to WebGUI (Default user: RAID pass: hpt)
7. Select your controller in the drop down menu on the top left.
8. Click the Physical tab and update firmware will be on the bottom of the page.
9. Click **Choose File** and browse to the BIOS file
10. Click **Submit**
11. **Reboot**

Using a Bootable USB to update BIOS/Firmware

Create a bootable USB using a utility such as Rufus. **Caution**: Creating a bootable USB will erase all previous data stored on it.

1. Download the latest BIOS/Firmware file found at www.highpoint-tech.com
2. Extract the file contents onto the bootable USB
3. Read the README for instructions on how to flash the BIOS onto your hardware.
4. Reboot your computer into DOS mode by:
   - Setting boot priority to the bootable USB
   - Removing all bootable drives (OS, CD Drives) from motherboard and leaving only the bootable USB and RocketRAID card plugged in
5. Once in DOS mode, you should see a command line interface

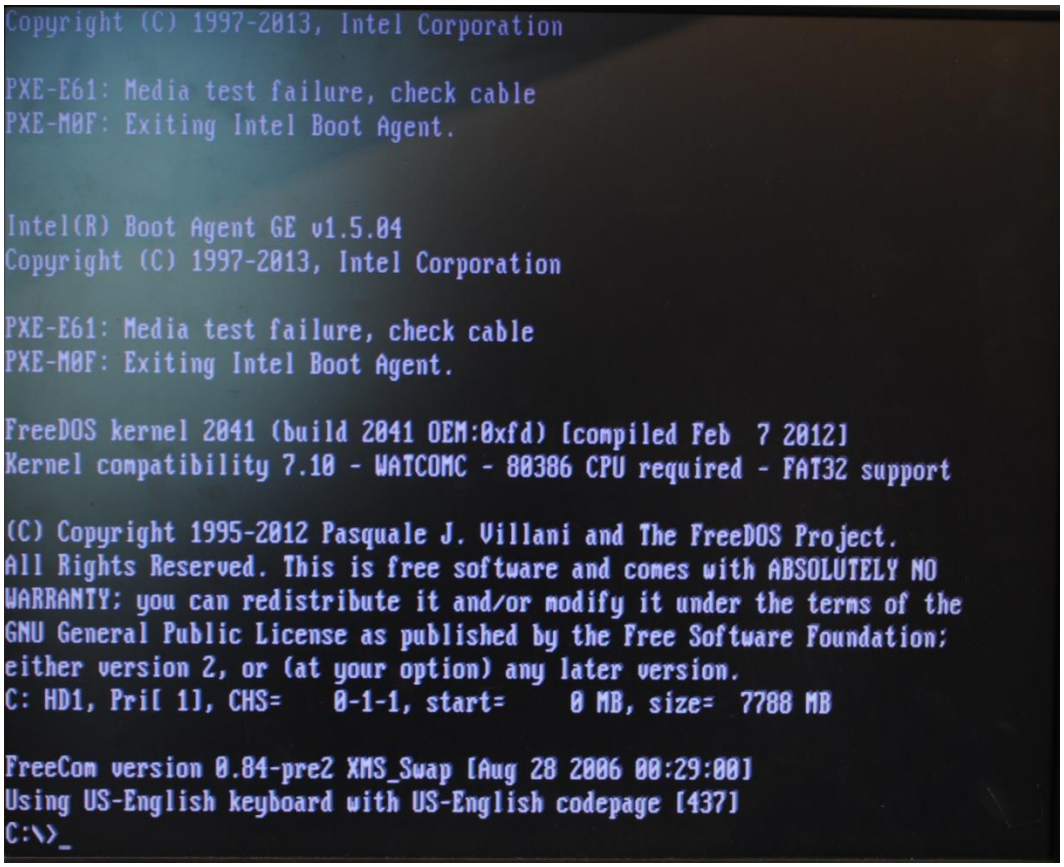

Copyright (C) 1997-2013, Intel Corporation
PXE-E61: Media test failure, check cable
PXE-M0F: Exiting Intel Boot Agent.
Intel(R) Boot Agent GE v1.5.04
Copyright (C) 1997-2013, Intel Corporation
PXE-E61: Media test failure, check cable
PXE-M0F: Exiting Intel Boot Agent.
FreeDOS kernel 2041 (build 2041 OEM:0xfd) [compiled Feb 7 2012]
Kernel compatibility 7.10 - WATCOMC - 80386 CPU required - FAT32 support
(C) Copyright 1995-2012 Pasquale J. Villani and The FreeDOS Project.
All Rights Reserved. This is free software and comes with ABSOLUTELY NO
WARRANTY; you can redistribute it and/or modify it under the terms of the
GNU General Public License as published by the Free Software Foundation;
either version 2, or (at your option) any later version.
C: HD1, Pri[1], CHS= 0-1-1, start= 0 MB, size= 7788 MB
FreeCom version 0.84-pre2 XMS_Swap [Aug 28 2006 00:29:00]
Using US-English keyboard with US-English codepage [437]
C:\>_

Figure 11. Bootable USB formatted with Rufus Utility, FreeDOS CLI (Command Line Interface)

6. Type in the command you found in the README (ex. load.exe <filename>
7. For RocketRAID 4522, the command is **go.bat** to update firmware **and** BIOS of the card. **Note**: To flash individual files, use the included flash utility by typing in flashelf 4522efi.blf
8. **Reboot**

Section 5: Navigating the HighPoint WebGUI

The HighPoint WebGUI management utility allows you to do several key things:

- Create and remove arrays
- Monitor disk health
- Update firmware and BIOS
- Change enclosure settings
- Troubleshoot faulty drives
- View general system overview

Tab Name	Function
Global View	View HBA (Host Bus Adapter) and Storage Properties
Physical	View Additional Controller properties Update BIOS/Firmware View disk properties Adjust selected disk behaviors
Logical	Manage and create RAID arrays
Setting	Adjust WebGUI controls settings
Event	Show WebGUI Event Log
SHI (Storage Health Inspector)	View and schedule S.M.A.R.T monitoring
Recover	Revert to previously created arrays
Logout	Logout of WebGUI
Help	Additional WebGUI documentation Online Web Support

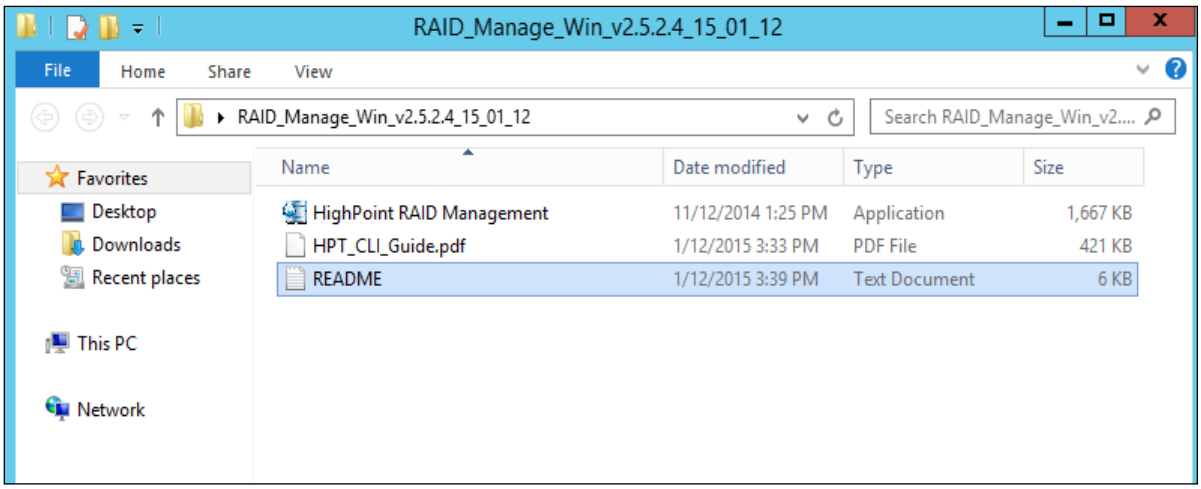
Installing HighPoint WebGUI

The HighPoint WebGUI is the primary link between you and your RAID array. Using the management utilities and menus offered by the WebGUI, you will be able to access, create, and maintain your RAID arrays.

New features are continually added to the interface; update to the latest version at www.highpoint-tech.com.

For **Windows** Users:

1. Locate the HighPoint WebGUI Setup on our website www.highpoint-tech.com and download the WebGUI package. Extract the contents and double click on **HighPoint RAID Management.exe**



Follow the on screen steps to install our software.

HighPoint RAID Management Setup
HighPoint
Welcome to the HighPoint RAID Management Setup Wizard
This wizard will guide you through the installation of HighPoint RAID Management .
It is recommended that you close all other applications before starting Setup. This will make it possible to update relevant system files without having to reboot your computer.
Click Next to continue.
Next >
Cancel

2. Log in the WebGUI by double clicking the desktop icon created or by typing http://localhost:7402 in your preferred browsers address line (it is recommended to use the latest version of your browser.)

For **Linux** Users:

Refer to the **installation guide** or **README** included in the driver package for the most accurate and up to date installation steps.

1. Download the Web RAID Management (WebGUI) for Linux online at www.highpoint-tech.com
2. Extract the .**tbz** file to the desktop, and browse to the appropriate .**rpm** file (there are 32 and 64-bit options).
3. Double click the .**rpm** file – this should open the operating systems software installer. Enter the Administrative password when prompted and proceed with installation.
4. The package can also be installed manually, using a terminal. Log on in as “root”, open a terminal, and browse to the location of the .rpm file. Run the following command:

```
# rpm -i hptsvr-https-1.4-10.i386.rpm (or hptsvr-https-1.4-
10.x86_64.rpm) (filename may vary)
```

For **Debian**/**Ubuntu** Linux distributions, you can use alien to convert the rpm packages to a .**deb** package, then use "**dpkg -i**" command to install each package. Some script files may be lost during the conversion process from rpm to .**deb**, so you may need to make manual corrections. .

The following files will be installed/configured:

/usr/bin/hptsvr - service program
/etc/hptcfg - service config file
/etc/rc.d/init.d/hptdaemon - service control script
/usr/share/hpt/webguiroot - data files

If there is no /etc/hptcfg present, you can add it manually using by using the “echo” command on the driver file name to /etc/hptcfg.

For example:

```
# echo hptiop.ko>/etc/hptcf
```

How to Login HighPoint WebGUI

You can reach the HighPoint WebGUI log in page either by:

- Double clicking on the **HighPoint RAID Management** icon created on your desktop
- Opening your preferred web browser and typing **http://localhost:7402** in the address bar.

The default username and password to login is

Username : RAID
Password: hpt

Username and Password are Case-Sensitive (Username is not changeable)

Remote Login

A user connected to a local network can remotely access the WebGUI using the IP address of the host device.

To obtain your IP address

For **Mac** Users:

1. Open a **terminal** window on the host computer (computer that is connected to the RS6422AS enclosure)
2. Type `ifconfig`
3. Look for the connection that has **status**: **active**
4. Write the IP address located after **inet**:

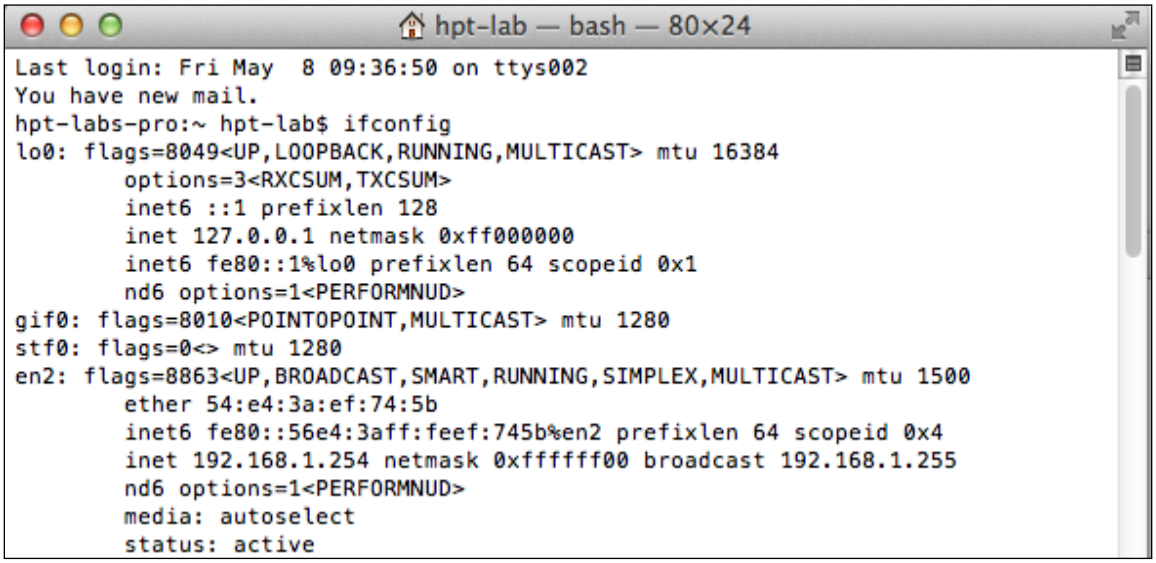


Figure 12. Example: en2 has active status, the IP is 192.168.1.254

For **Windows** Users:

1. Open a command prompt window on the host computer.

2. Type `ipconfig`
3. Look for the section that contains your network adapter information
4. Take ***Note*** the IP address

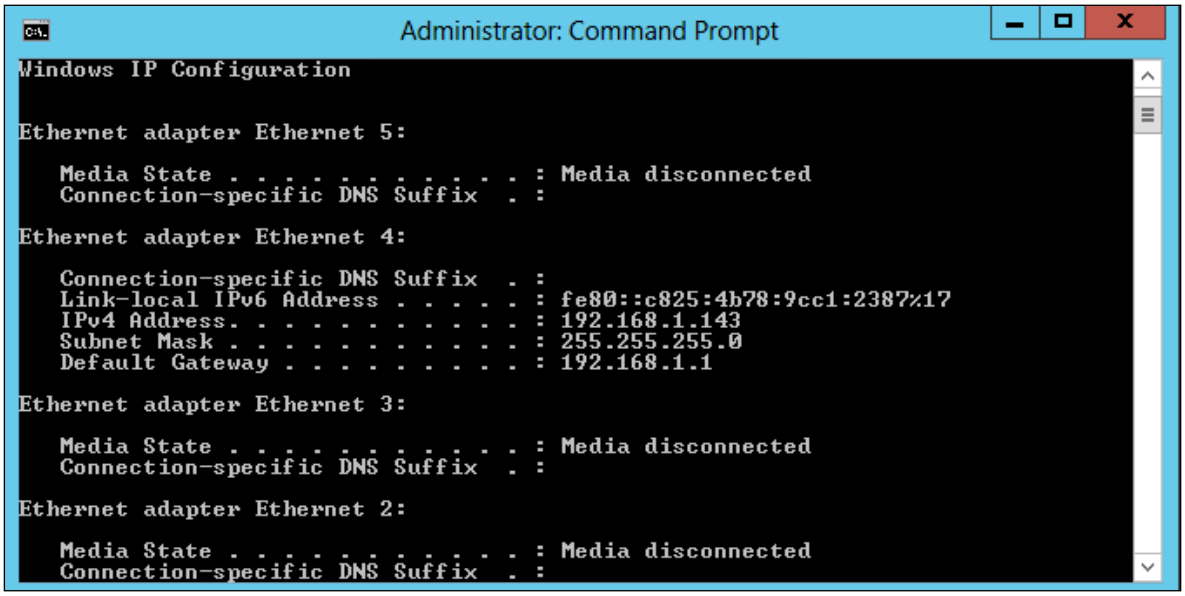
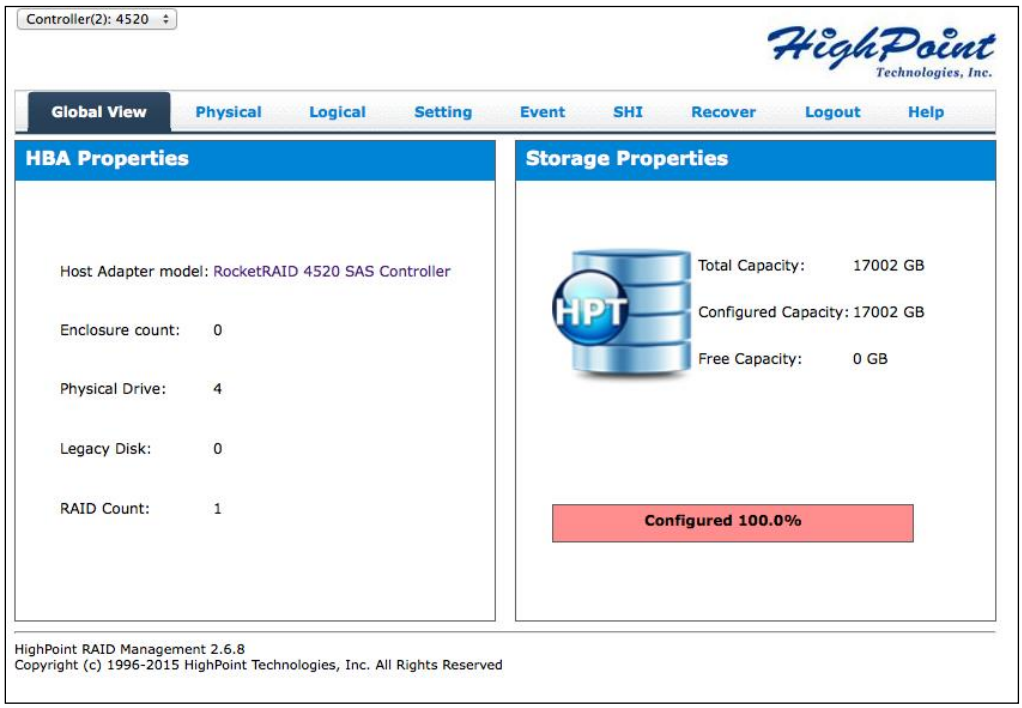

Administrator: Command Prompt
Windows IP Configuration
Ethernet adapter Ethernet 5:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Ethernet adapter Ethernet 4:
Connection-specific DNS Suffix . :
Link-local IPv6 Address . . . . . : fe80::c825:4b78:9cc1:2387%17
IPv4 Address. . . . . : 192.168.1.143
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 192.168.1.1
Ethernet adapter Ethernet 3:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :
Ethernet adapter Ethernet 2:
Media State . . . . . : Media disconnected
Connection-specific DNS Suffix . :

Figure 13. Example: The IPv4 address is under Ethernet adapter Ethernet 4 and is 192.168.1.143

Note: Make sure **Restrict to localhost access** is **disabled** in WebGUI **Setting** (Refer to setting)

You can then remotely access the WebGUI using any other computer that is in your local network by opening any web browser and typing **http://{IP address of host computer}:7402** (default port is 7402)

Global Tab



The GUI Global view provides an overview of what each HighPoint controller card connected to your computer detects. It is also the first page you see when logging in.

- Host Bus Adapter Properties
- Storage Properties

On the top left of the page is a drop down menu that allows you to select which controller you want to manage (if you have multiple HighPoint controllers connected).

Viewing HBA Properties

1. Log in to WebGUI
2. Select the proper controller from drop down on the top left
3. Click **Global View**

HBA Properties

- **Host Adapter model**: the model name of the controller
- **Enclosure Count**: number of external enclosures detected
- **Physical drives**: number of drives seen by the controller
- **Legacy Disks**: number of Legacy disks connected. Legacy disks are physical drives that have previous partitions stored on them.

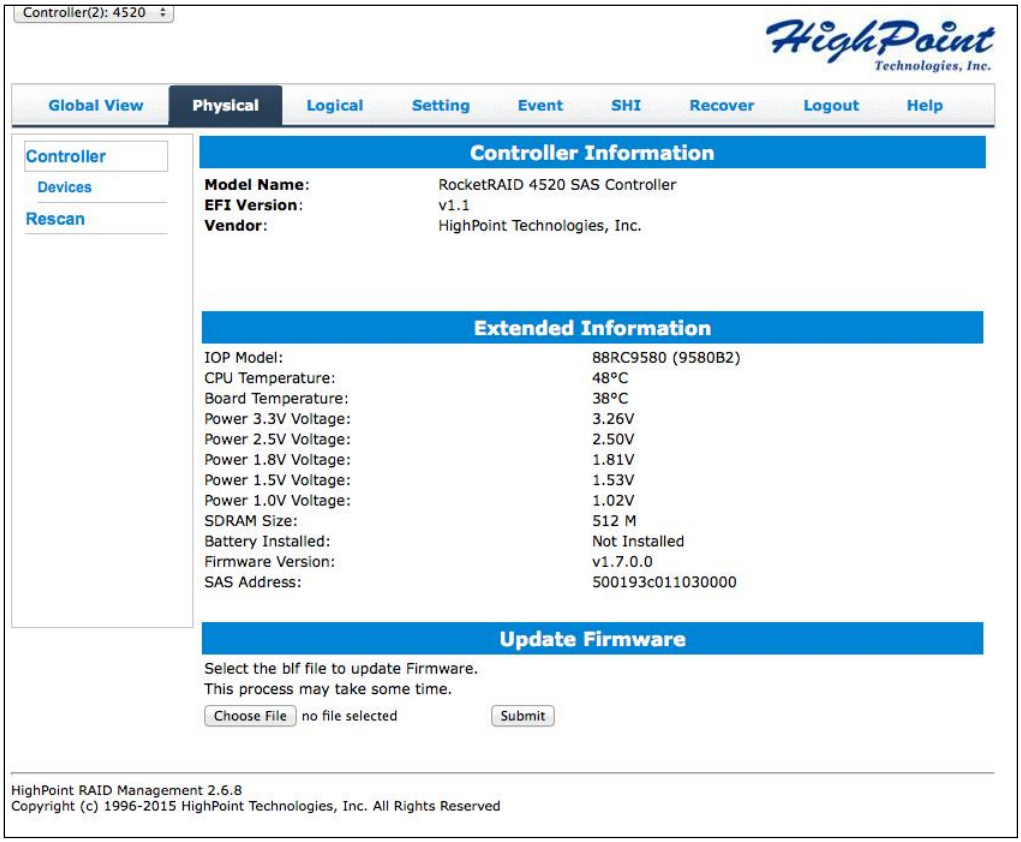
Viewing Storage Properties

1. Log in to WebGUI
2. Select the controller from drop down menu on top left
3. Click **Global View**

Storage Properties

Total capacity: the combined capacity of each physical disk connected to controller
Configured capacity: the amount of space used for creating arrays
Free Capacity: total amount of space unused

Physical Tab



The physical tab shows general and extended information about the controller you are using. Information about the firmware, BIOS, and operating temperatures are all located here. This information is useful for identifying what RAID controller model you have and to make sure you have the most updated version available.

The physical tab contains the following information:

- Controller Information
- Extended Information
- Update Firmware
- Physical Devices Information

Controller Information:

- Model Name: RocketRAID 4522 SAS Controller (for RS6422AS)
- BIOS Version: v1.12 (as of 5/5/2015)
- Vendor: HighPoint Technologies, Inc.

Extended Information: Gives you additional information concerning the HBA (**H**ost **B**us **A**dapter) in the enclosure

- **IOP Model**: IOP chip model number
- **CPU Temperature**: Displays computer temperature in Celcius (℃).
- **Board Temperature**: Displays the board temperature in Celcius (℃).
- **SDRAM Size**: SDRAM size of the HighPoint controller card
- **Battery Installed**: Battery Backup Unit
- **Firmware Version**: Firmware version of the HBA
- **SAS address**: the SAS address

Update Firmware: Allows you to update the controller BIOS through the WebGUI.

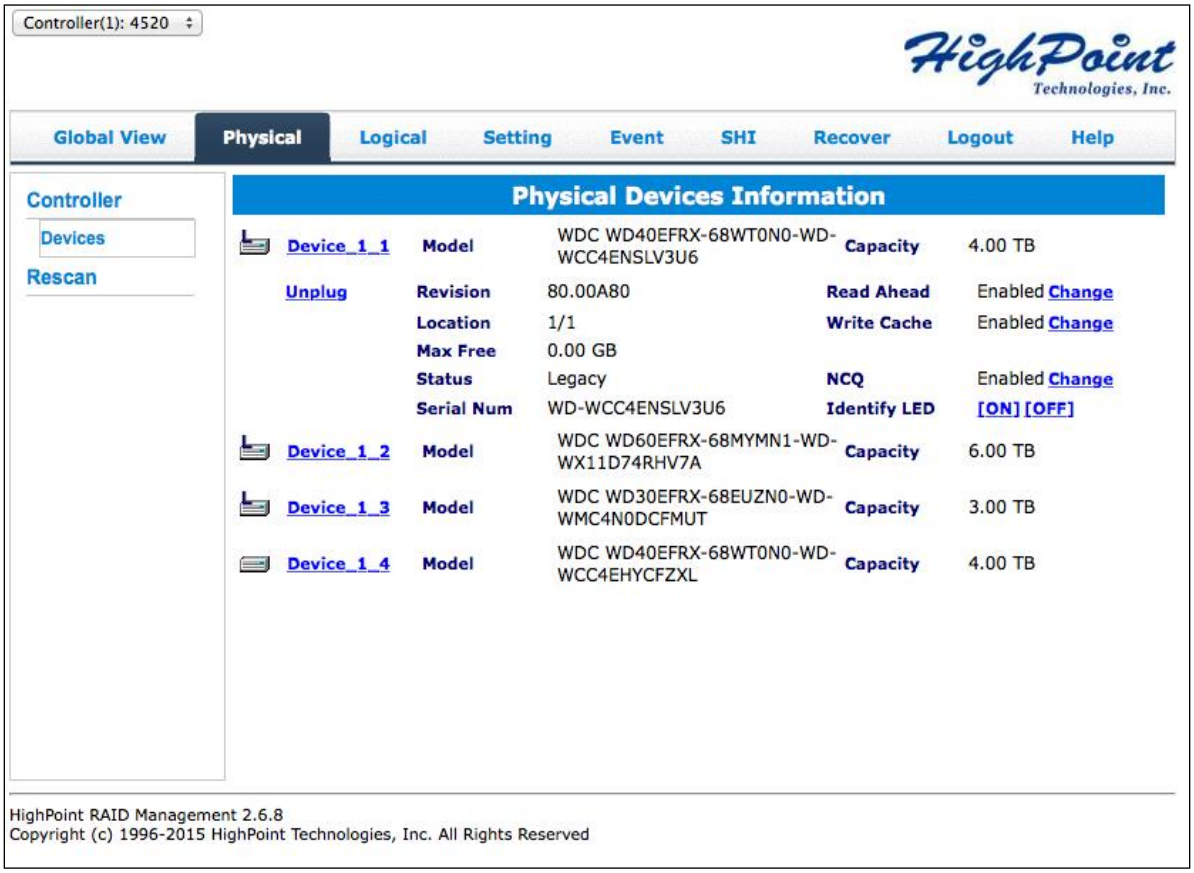
Updating BIOS/Firmware

Keeping the firmware up to date ensures that your RAID controller the latest compatibility and performance updates. Firmware files have extension **.blf**.

1. Locate the latest firmware on our webpage at www.highpoint-tech.com
2. Extract the contents of the file
3. Read the **README** to ensure you have the correct firmware for your HBA **Note:** Your HBA name and properties can be found in the **WebGUI** > **Physical Tab**.
4. Locate the proper firmware file (eg. 4520fw.blf, refer to the **README** for exact name)
5. Click **Choose File** and browse to your firmware file
6. Click **Submit**
7. **Reboot**

Obtaining Physical Device Information

1. Log in to WebGUI
2. Click **Physical**
3. Click **Devices** located on the left panel



The following properties are part of the **Physical Devices Information** box under the physical tab.

- **Model** – Model number of the physical drive
- **Capacity** – Total capacity of the physical drive
- **Revision** – HDD device firmware revision number
- **Read Ahead*** - (Enable/Disable) Disk read ahead.
- **Location** – Device location (example: 1/2 states controller 1, slot 2)
- **Write Cache*** – (Enable/Disable) the disk write cache
- **Max Free** – space on disk that is not configured in an array
- **Status** – (Normal, disabled, critical) status of the disk
- **NCQ*** – (Enable/Disable) Native Command Queuing
- **Serial Number** – serial number of the physical disk
- **Identify LED*** – On/Off – toggle the IDENTIFY (RED) on the front panel
- **Unplug** – Safely ejects selected disk. Other methods of disk removal will trigger alarm if enabled.

* Disk properties that can be adjusted.

Read Ahead
Enabling disk read ahead will speed up read operations by pre-fetching data and loading it into RAM.

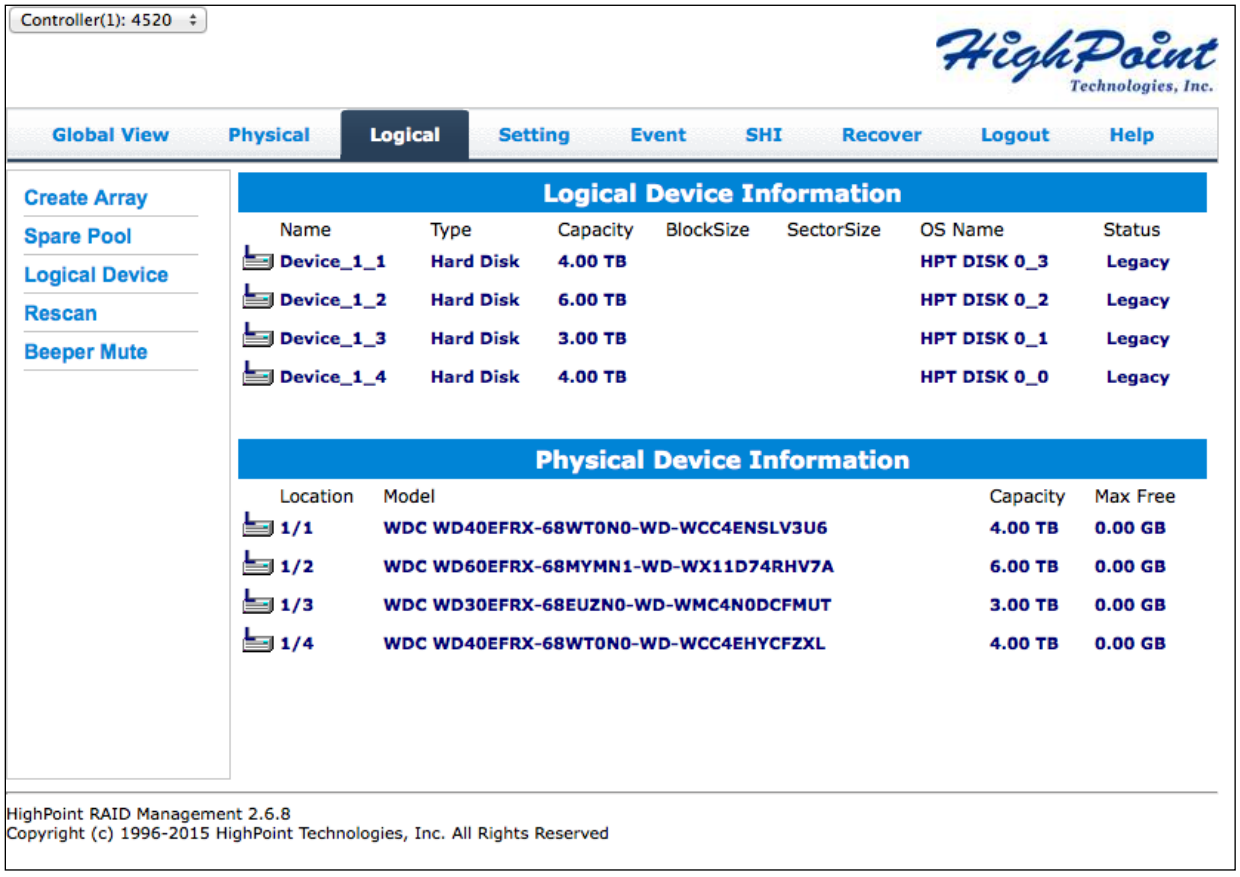
Write Cache
Enabling write cache will speed up write operations.

NCQ (Native Command Queuing)
A setting that allows disks to queue up and reorder I/O commands for maximum efficiency.

Identify LED
The Disk tray LED lights on the front panel can be toggled ON or OFF.

Rescan
Clicking rescan will immediately signal the controller to scan for any changes in the connection. Clicking this button will also stop any alarm if currently ringing.

Logical Tab


Controller(1): 4520
HighPoint Technologies, Inc.
Global View
Physical
Logical
Setting
Event
SHI
Recover
Logout
Help
Create Array
Spare Pool
Logical Device
Rescan
Beeper Mute
Logical Device Information
Name Type Capacity BlockSize SectorSize OS Name Status
Device_1_1 Hard Disk 4.00 TB HPT DISK 0_3 Legacy
Device_1_2 Hard Disk 6.00 TB HPT DISK 0_2 Legacy
Device_1_3 Hard Disk 3.00 TB HPT DISK 0_1 Legacy
Device_1_4 Hard Disk 4.00 TB HPT DISK 0_0 Legacy
Physical Device Information
Location Model Capacity Max Free
1/1 WDC WD40EFRX-68WT0N0-WD-WCC4ENSLV3U6 4.00 TB 0.00 GB
1/2 WDC WD60EFRX-68MYMN1-WD-WX11D74RHV7A 6.00 TB 0.00 GB
1/3 WDC WD30EFRX-68EUZN0-WD-WMC4N0DCFMUT 3.00 TB 0.00 GB
1/4 WDC WD40EFRX-68WT0N0-WD-WCC4EHYCFZXL 4.00 TB 0.00 GB
HighPoint RAID Management 2.6.8
Copyright (c) 1996-2015 HighPoint Technologies, Inc. All Rights Reserved

The Logical tab is where you are edit, delete, and maintain your RAID configurations, as well as, adding drives to your spare pool. The logical tab has the following settings:

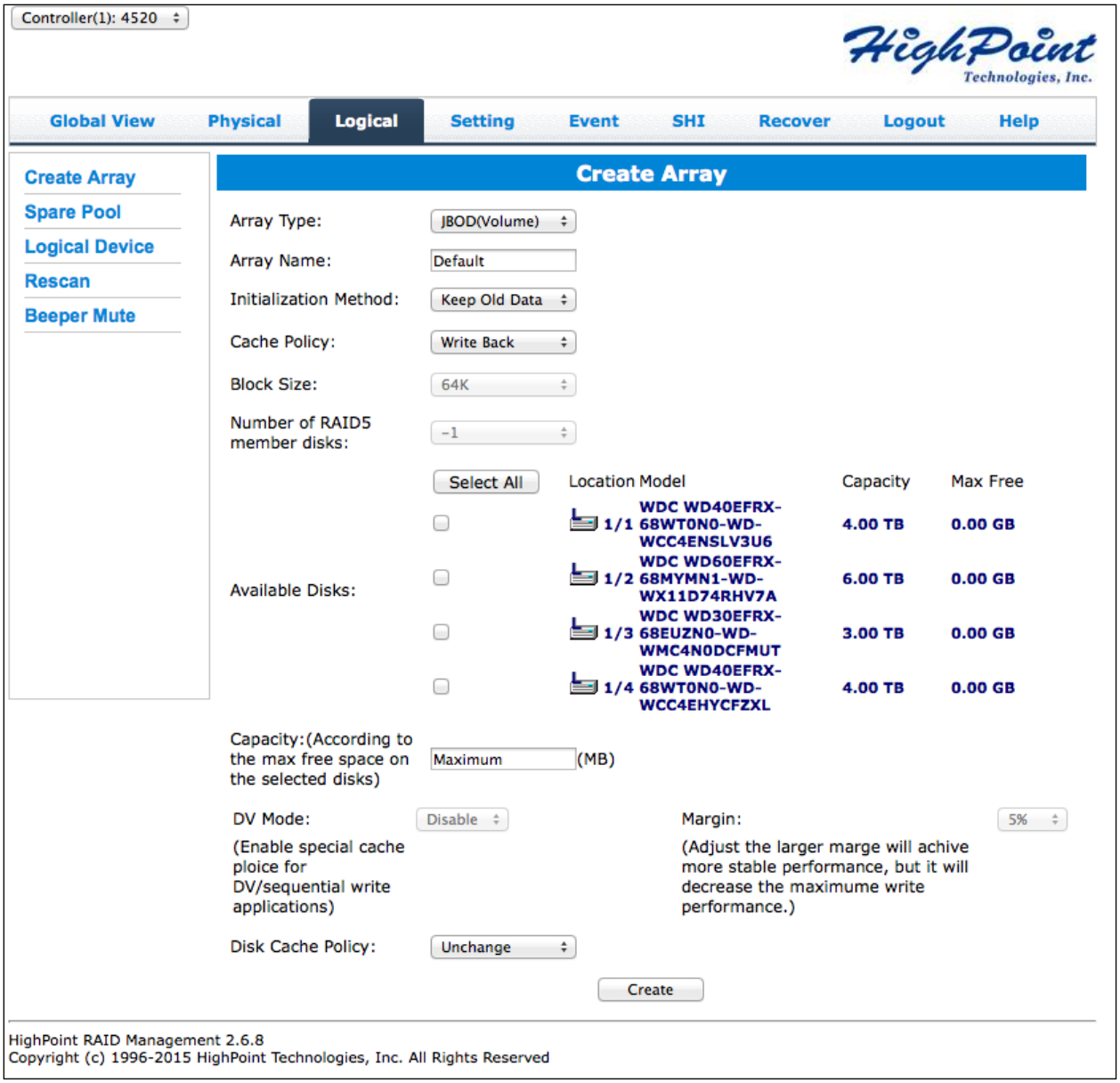
- Create Array
- Spare Pool
- Logical Device
- Rescan
- Beeper Mute

Creating an Array

To create an array:

1. Log into the WebGUI
2. Select the proper **controller** from the drop down on the top left
3. Click **Logical**
4. Click **Create Array**

An array is a collection of physical disks that will be seen as one virtual drive by your Operating System (OS). The RS6422AS has a RocketRAID 4522 controller capable of creating the following array types



Array Type:

- JBOD – Just a Bunch of Disks
- RAID 0 - Striping
- RAID 1 - Mirroring
- RAID 5 – Rotating Parity bit
- RAID 1/0 – Striping of Mirrored Drives
- RAID 5/0 – Striping of Distributed Parity
- RAID 6 – Double Parity Bit

Each RAID level has its pros and cons based on the application you use it for (Note: Refer to RAID level Quick Reference)

Array Name: the name that will be displayed in Logical Device Information (**Default**: RAID_<level>_<array number>)

Initialization Method: Initialization of a disk sets all data bits to 0, essentially clearing all the data on the drive. It is important to initialize disks since previous data physically stored on the drive may interfere with new data.

- **Keep Old Data**: This option skips the initialization process and all data on each physical disk of the array will be untouched.
- **Quick Init:** This option grants immediate access to the RAID array by skipping the initialization process, but it will delete all data. **Note***:* Skipping initialization is generally not recommended since residual data on disks may interfere with new data in the future.
- **Foreground**: The array initialization process will be set at high priority. During this time array will be non-accessible, but initialization completion time will be shorter.
- **Background**: The array initialization process will have a lower priority. During this time array will be accessible, but initialization completion time will be longer.

Note 1: Initializing takes a significant amount of time (approximately 2 hours per 1 TB).

Background and Foreground Initialization

Fully initializing the array will completely zero out the data on the disks, meaning the disk will be completely wiped and every bit on the disk will be set to 0. Foregoing initialization means the array will still be created, and you can still write new data onto the array. But when your array requires rebuilding, residual data left behind may interfere with the process.

Cache Policy (Default: Write Back)

Write Back – Any data written to the array will be stored as cache, resulting in better I/O performance at the risk of data failures due to power outages. Data will be stored as cache before it is physically written to the disk; when a power outage occurs, any data in the cache will be lost.

Write Through – Data written to an array is directly written onto the disk, meaning lower write performance for higher data availability. Without cache acting as a buffer, write performance will be noticeably slower but data loss due to power outages or other failures is significantly minimized.

Block Size (default: 64K)

[16K, 32K, 64K, 128K, 256K, 512K, 1024K are the supported block sizes]

Adjusting the block size towards your disk usage can give some performance gain.

In a typical RAID configuration, data of the virtual drive is striped (or spread across) the physical drives. Having a smaller array block size will increase the likelihood of accessing all physical drives when processing large I/O requests. Multiple physical drives working in parallel increases the throughput, meaning better performance.

For smaller I/O requests (512 bytes to 4 kilobytes), it is better to have each individual disks handle their own I/O request, improving the IOPS (I/O per second), rather than having one tiny I/O request being handled by multiple disks.

A block size of 64k is recommended because it strikes a balance between the two I/O usage scenarios.

Capacity (Default: Maximum)

The total amount of space you want the RAID array to take up. When creating RAID levels, disk capacities are limited by the smallest disk.

An example of how disk capacities are limited by smallest disk.

- You have 3 drives connected to the enclosure.
- First drive is 6 TB, second is 4 TB, and third drive is 2 TB.
- After creating a RAID level 5 using all three drives and maximum capacity
- The first drive will have 4 TB, the second 2 TB, and the third drive 0 TB free capacity
- The free capacity on the first and second drive can be used to create a separate array.

You may also choose how much space each array will take. You can use the remaining space to create another array (up to 4 arrays are supported)

Sector Size (Default: 512B)

Note*:* For current operating systems, this option is already implemented so changing it in the WebGUI is not necessary.

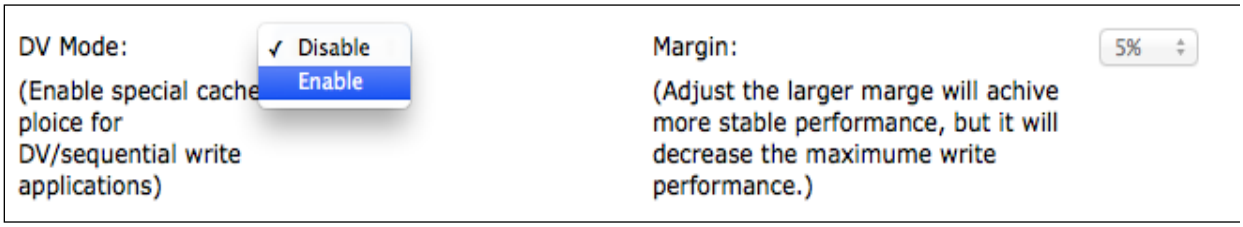
This option will set the sector size of your virtual drive, and physical sector sizes on your physical disks will remain the same. A sector is the smallest physical storage unit on a disk. The default sector size is 512 B since it is the most common sector size in disks today.

DV Mode

This mode is specifically designed for video applications. The default firmware cache policy provides balanced performance for standard applications such as workstations, file servers, and web servers. But for DV mode, a special cache firmware is implemented specifically for large sequential writing (large I/O requests such as video files). Enabling DV mode will maintain the performance and consistency of transferring and processing video files.

There are several factors concerning DV mode to take note:

- DV mode only available for RAID 0, 5, and 6
- Only 1 RAID array you created can enable DV mode
- DV mode only works when array status is normal

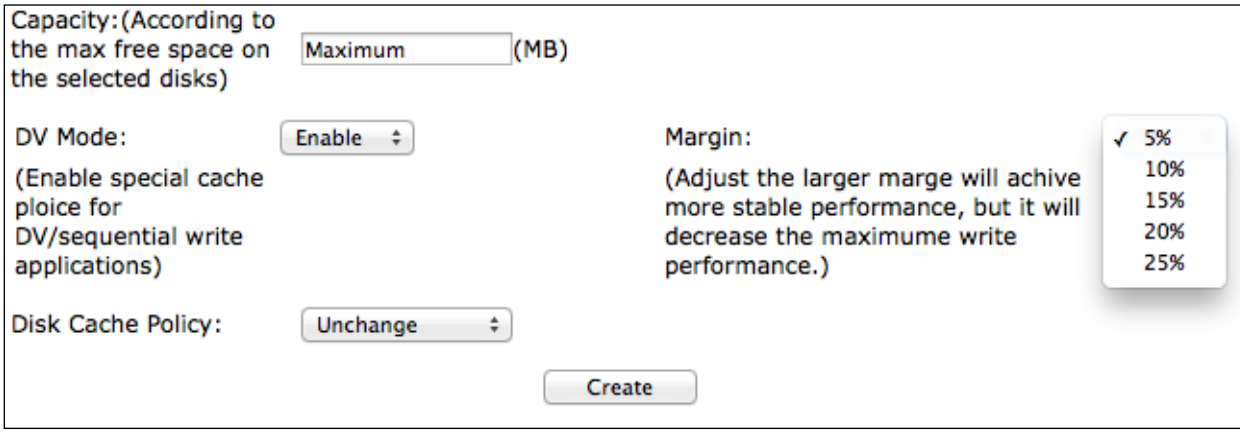

DV Mode:
✓ Disable
Enable
(Enable special cache ploice for DV/sequential write applications)
Margin:
5%
(Adjust the larger marge will achive more stable performance, but it will decrease the maximume write performance.)

Margin

[5% - 25%]

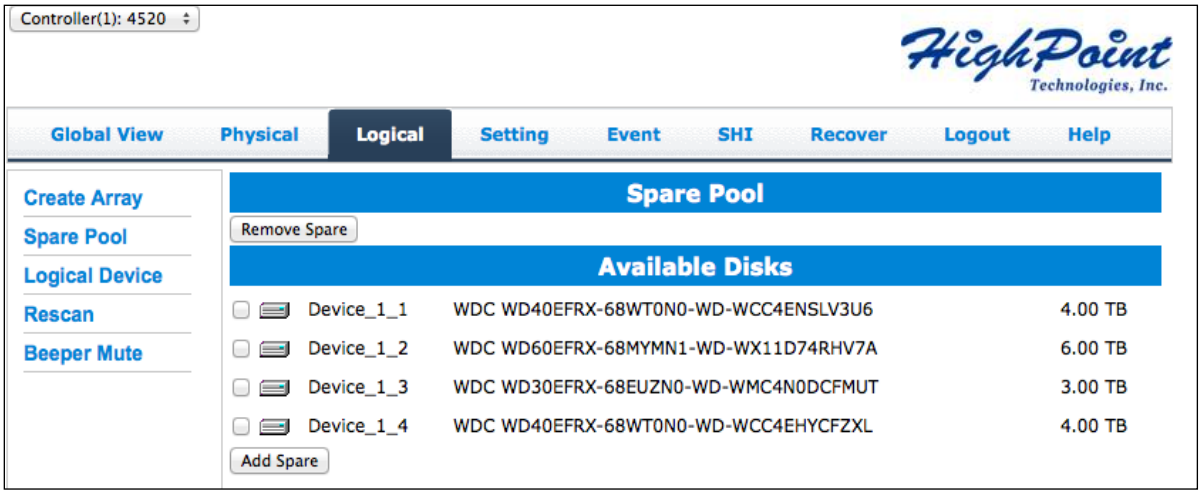
When DV mode is enabled, you have the option to set the margin.
This percentage represents the amount of space the designated cache will hold before flushing the data onto the drive. Increasing the margin % will result in more stable performance, but decrease the maximum write performance.

Alternatively, you can change the margin anytime in Logical > Maintenance for DV enabled array.



Adding Spare Disks

Spare disks are physical disks that will immediately replace critical disks in an array.



To add spare disks:

1. Log in WebGUI
2. Click **Logical**
3. Click **Spare Pool**
4. Check the box for the disk you want as a spare from **Available Disks**
5. Click **Add Spare**

Disks added to the spare pool will show under **Spare Pool** and can be removed by checking the disk checkbox from **Spare Pool** > Click **Remove Spare**

Physical drives marked as a spare will automatically be added to an array whenever there is a disk failure. Having this feature minimizes the chances of a data loss by reducing the time an array is in critical status.

Obtaining Logical Device Information

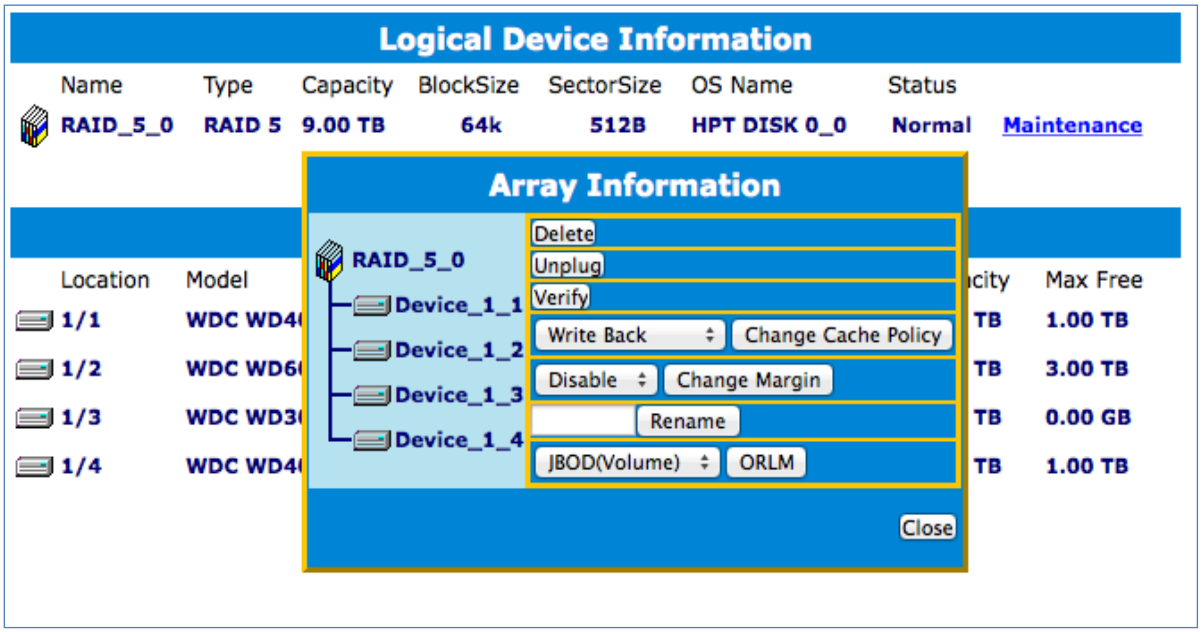
Logical device tab is the default page upon clicking the Logical tab of the WebGUI. This page contains information about your RAID arrays and individual disks your system detects.

Logical Device Information
Arrays you create and the properties associated with them will appear here.

Maintenance
Once an array has been created, you have the option maintain it.

Array Information
Clicking on the maintenance button will show you the Array information box. Different array statuses (Normal, critical, disabled) will have different maintenance options.

Normal Status

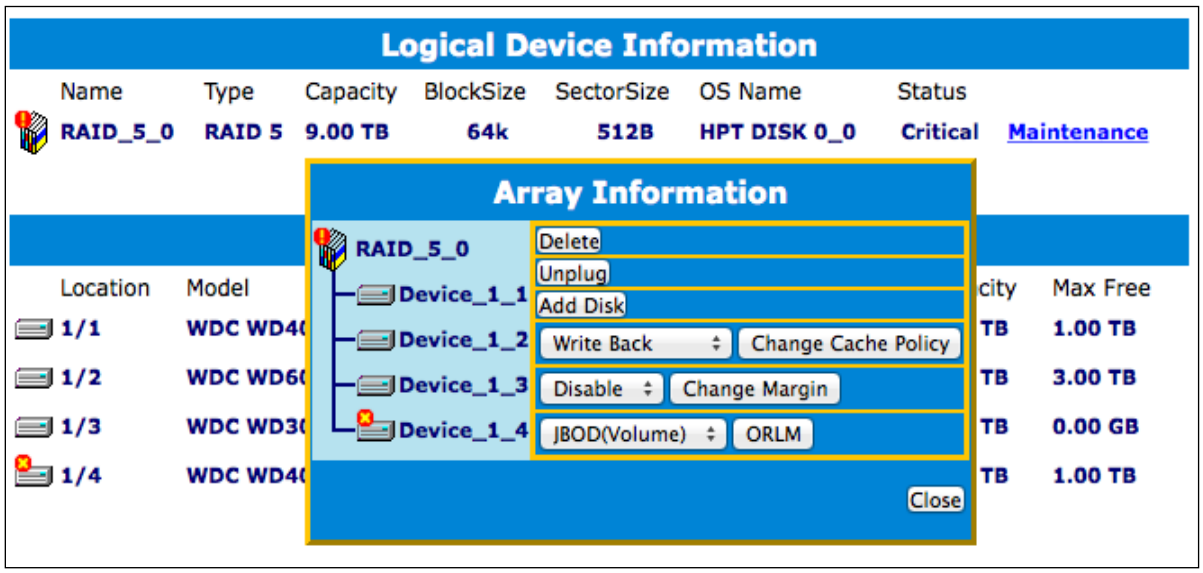


A Normal Status Array has the following options:

- Delete
- Unplug
- Verify
- Change Cache Policy
- Change Margin
- Rename
- ORLM

Delete – deletes the selected RAID array
Unplug – powers off the selected RAID array
Verify – verifies the integrity of the RAID array
Change Cache Policy – Toggles between Write through and Write back cache
Change Margin – Adjust margin when DV mode is enabled
Rename – renames the RAID array
OCE/ORLM – **O**nline **C**apacity **E**xpansion / **O**nline **R**AID **L**evel **M**igration

Critical Status



A critical status array has all the normal status options except the following:

- The Array can no longer be renamed
- **Add disk** replaces the **verify disk** option

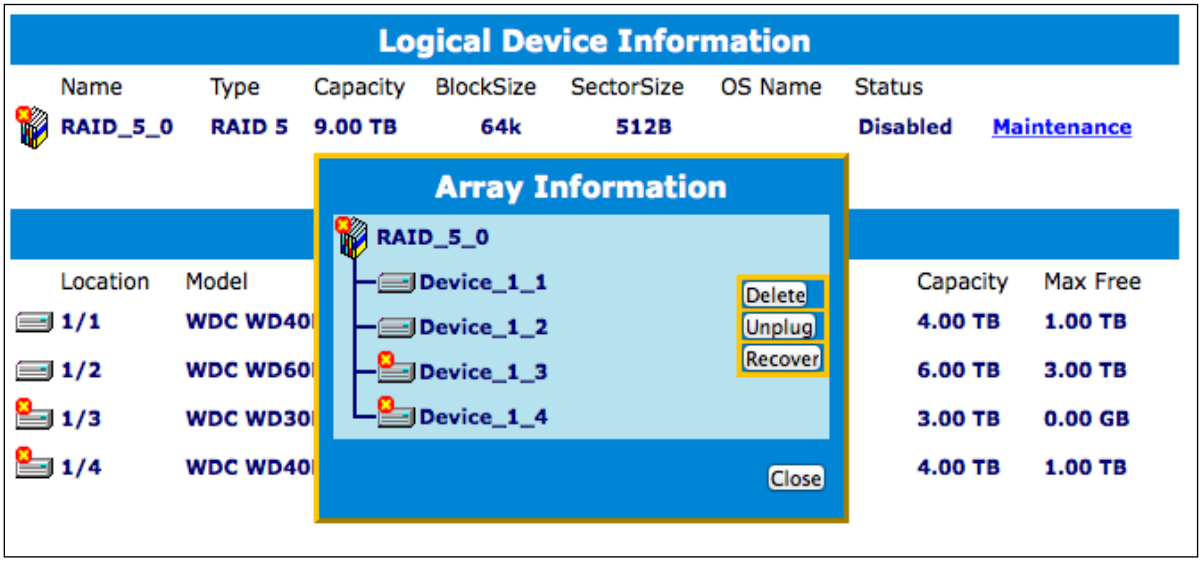
Once array status changes to critical, the faulty disk will be taken offline and you can either:

- Reinsert the same disk
- Insert new disk

Reinserting the same disk should trigger rebuilding status, since data on the disk would be recognized.

If you insert a new disk, clicking **add disk** will give you the option to select that disk and add it to the array.

Disabled Status



A disabled status array means that your RAID level does not have enough disks to function.

- Your data will be inaccessible
- Rebuilding will not trigger, since RAID does not have enough parity data to rebuild upon

Your options in Maintenance are:

- Delete
- Unplug
- Recover

Delete – will delete the array
Unplug – will take array offline, making it safe to remove
Recover – will attempt to recover the array using the list from the recover tab

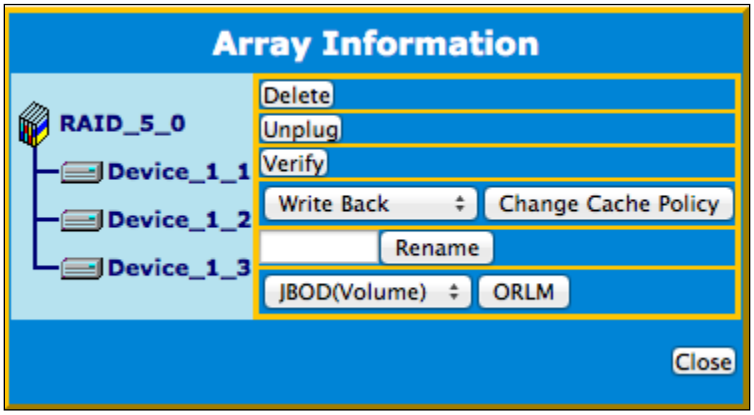
Expanding an Existing Array

Important: It is recommended to **Verify/Rebuild** your array before **Expanding** or **Migrating**. Once you start an **OCE/ORLM** procedure, you *can* stop the process but it **must** be resumed until completion.

To add more capacity to your current configuration follows these steps:

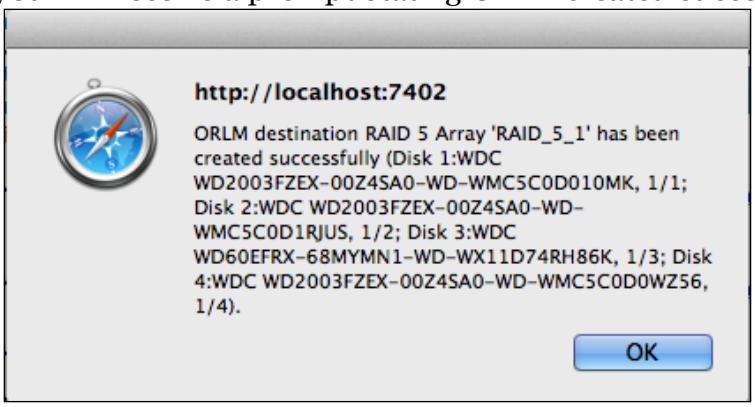
1. Log in WebGUI
2. Select desired controller from drop down menu on top left
3. Click **Logical**
4. Click **Maintenance** for the array you want to change
    - Select a **different** RAID level to **Migrate**

- Select the **same** RAID level to **Expand**



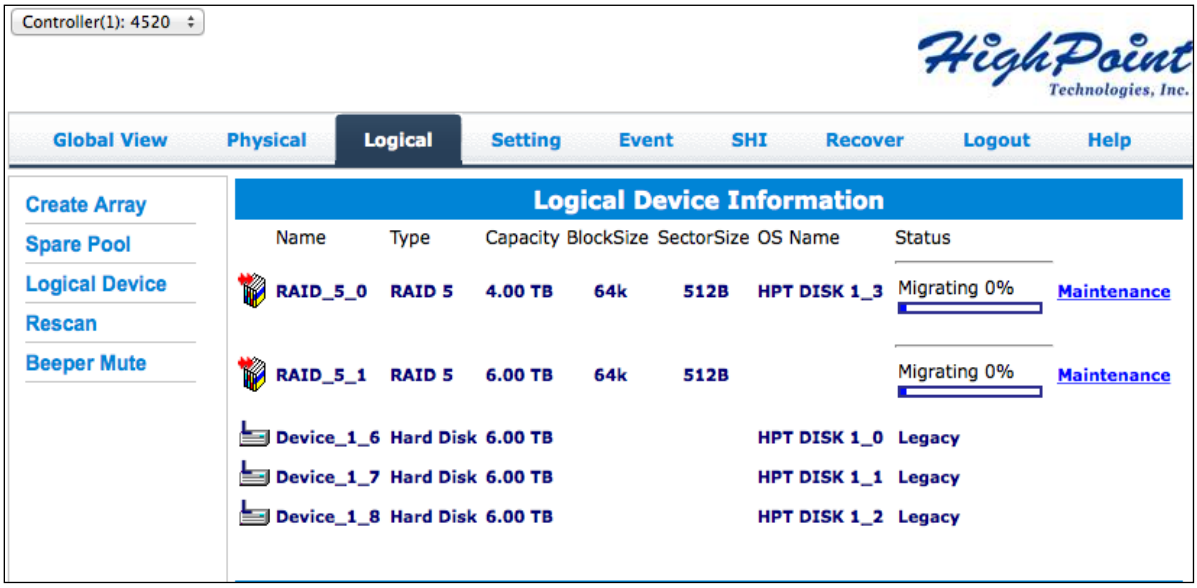
5. **Important**: Record all the physical drives currently in array.
6. Click **ORLM**
7. Select the physical drives you recorded earlier and the drives you want to add
8. Click **Submit**

Upon submission, you will receive a prompt stating ORLM created successfully.


http://localhost:7402
ORLM destination RAID 5 Array 'RAID_5_1' has been created successfully (Disk 1:WDC WD2003FZEX-00Z4SA0-WD-WMC5C0D010MK, 1/1; Disk 2:WDC WD2003FZEX-00Z4SA0-WD-WMC5C0D1RJUS, 1/2; Disk 3:WDC WD60EFRX-68MYMN1-WD-WX11D74RH86K, 1/3; Disk 4:WDC WD2003FZEX-00Z4SA0-WD-WMC5C0D0WZ56, 1/4).
OK

The **Logical Device Information** will change status to **migrating**.

Physical Device Information



- **Location** – which controller and port the drive is located in
- **Model** – model number of the drive connected
- **Capacity** – total capacity of the drive
- **Max Free** – total capacity that is not configured

Rescan

Clicking rescan will force drivers to report array status. For any disk(s) you hot plug into the device, do not click rescan until all physical drives are detected and appear under Logical Device Information.

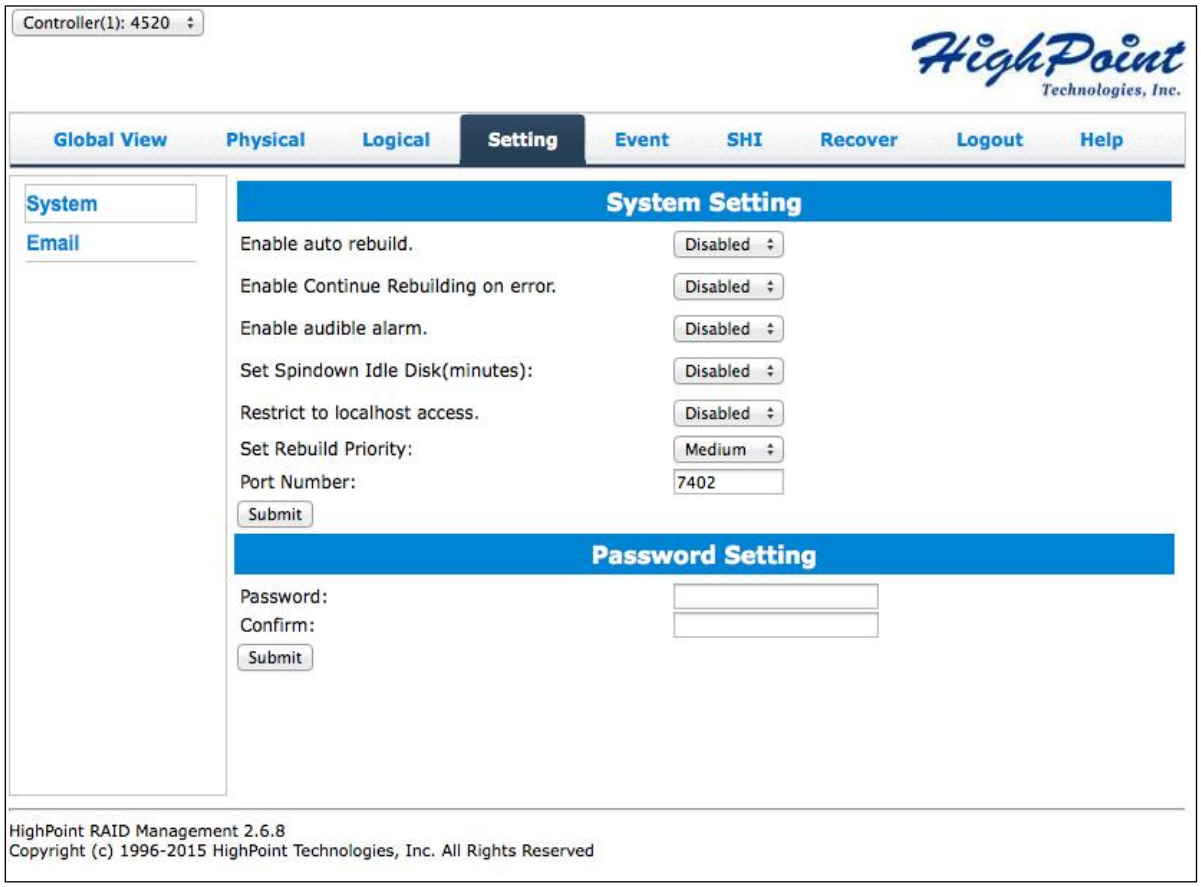
Beeper Mute

The controller emits a beeping sound whenever an

- Array falls into **critical** status
- Array falls into **disabled** status
- You unplug a disk
- Your disk fails due to bad sectors
- SMART sensors anticipate drive failure

If device is currently beeping, clicking Beeper Mute will mute the sound immediately. ***Note***: This button does not permanently mute the alarm. In order to permanently mute the alarm, go to **Setting** > **Enable audible alarm** > **Disabled**.

Setting Tab



Under this tab, users can

- Enable auto-rebuilding
- Enable rebuilding on error
- Turn audible alarm on/off
- Set spindown time for idle disks
- Restrict to localhost
- Set rebuild priority
- Change port number
- Change WebGUI password

System Settings

Enable auto rebuild (default: Enabled)

When a physical drive fails, the controller will take the drive offline. Once you re-insert or replace the disk, the controller will not automatically rebuild the array unless this option is enabled.

Enable continue rebuilding on error (default: Enabled)

When enabled, the rebuilding process will ignore bad disk sectors and continue rebuilding until completion. When rebuild is finished, the data may be accessible but data inconsistency due to ignored bad sectors may cause problems in the future. If this option is enabled, HighPoint recommends user to check the event log for bad sectors.

Enable audible alarm (default: Enabled)

When a physical disk fails, the controller will emit an audible sound signaling failure. This option mutes the alarm.

Set Spindown Idle Disk (minutes) (default: Disabled)

When set, physical drives will spindown a certain amount of time after disk activity ceases. Only 10, 20, 30, 60, 120, 180, 240 minutes setting are available.

Restrict to localhost access (default: Enabled)

Remote access to the controller will be restricted when **enabled**, other users in your network will be unable to remotely log in to the WebGUI.

Rebuild Priority (default: Medium)

You can specify the amount of system resources you want to dedicate to rebuilding the array. There are 5 levels of priority [Lowest, Low, Medium, High, Highest]

Port Number (default: 7402)

The default port that the HighPoint WebGUI listens on is 7402. You may change it to any open port.

Password Setting

Changing your WebGUI password

Under Password Setting type your new password and confirm it, then click submit.

Recovering your WebGUI password

If you wish to revert to the default password: hpt, delete the file hptuser.dat.

For **Mac** Users:

1. Open **Terminal**
2. Type or navigate to cd **/usr/share/hpt**
3. Type rm **hptuser.dat**, to remove the file
4. Reboot

For **Windows** Users:

1. Open file explorer
2. Navigate to **C:/Windows/**
3. Delete **hptuser.dat**
4. Reboot

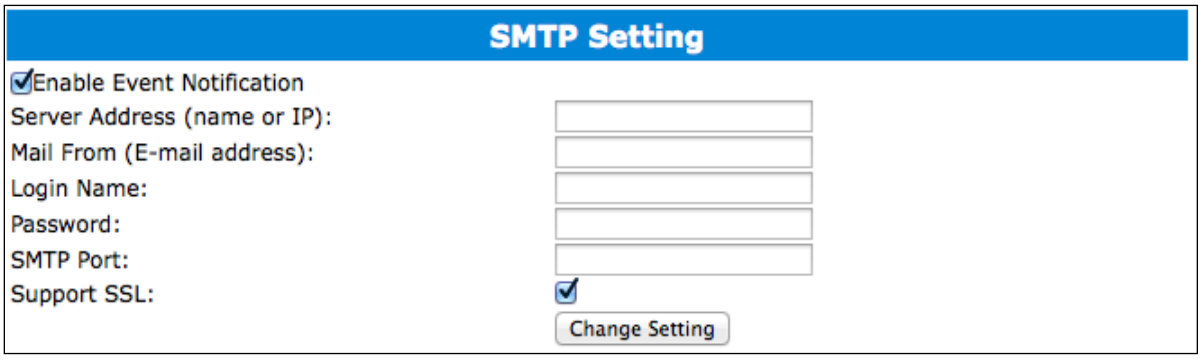
Email Setting

The following topics are covered under email:

- SMTP Setting
- Adding Recipients

You can set the controller to send an email out to recipients of your choosing when certain events (refer to Event Tab) trigger.

SMTP settings

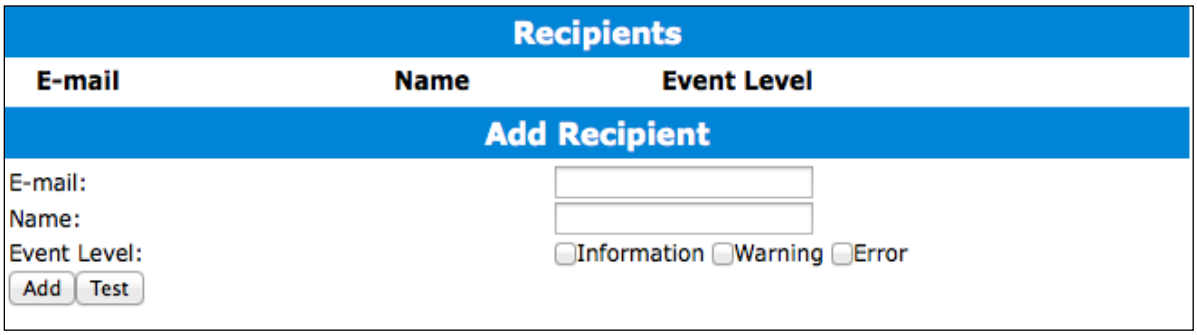


To set up email alerts:

1. Check the Enable Event Notification box.
2. Enter the ISP server address name or SMTP name
3. Type in the email address of the **sender** (email account that is going to **send** the alert)
4. Type in the account name and password of the sender
5. Type in the SMTP port (default: **25**)
6. Check support SSL box if SSL is supported by your ISP (port value will change to **465**).

Note: After you click 'Change Setting' the password box will become blank.

How to Add Recipients



You can add multiple email addresses as receivers of a notice.

1. Type the email of the recipient in the **E-mail** text box
2. Type the name of the recipient in the **Name** text box
3. Check which type(s) of events will trigger an email in the respective **Event Level** check boxes
4. (**Optional**) Click **test** to confirm settings are correct by sending out a test email
5. Click **add** to add the recipient to recipient list
6. The added recipient will display in under **Recipients**

The email will send to your recipients the output recorded in the event log.
Example email message:

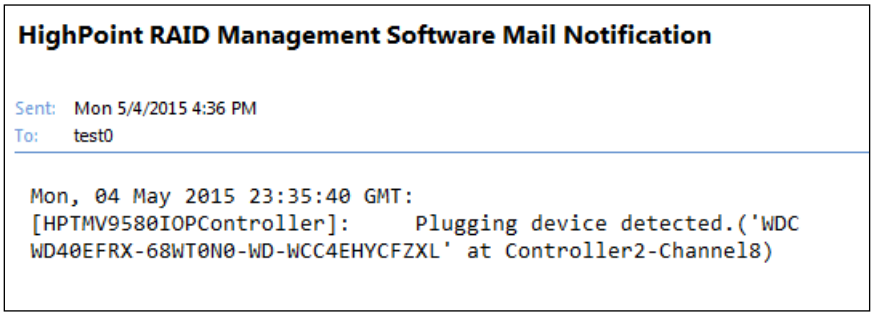
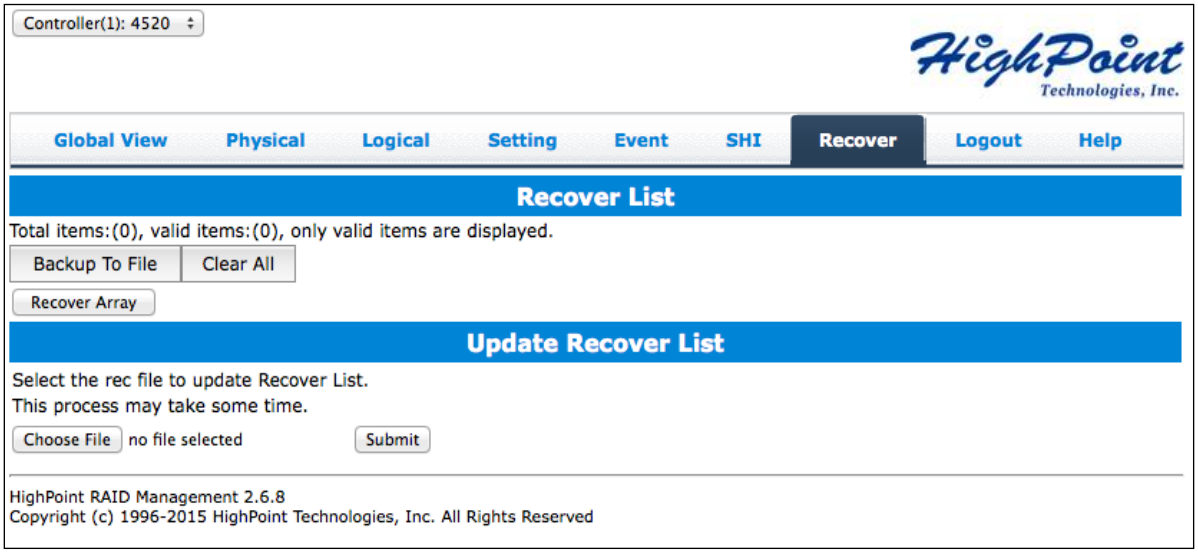

HighPoint RAID Management Software Mail Notification
Sent: Mon 5/4/2015 4:36 PM
To: test0
Mon, 04 May 2015 23:35:40 GMT:
[HPTMV9580IOPController]: Plugging device detected.('WDC WD40EFRX-68WT0N0-WD-WCC4EHYCFZXL' at Controller2-Channel8)

Figure 14. Example event log email

Recover Tab



Previously created arrays will be stored under this tab. Recovering an array from here will attempt to recover a '**disabled'** array and make it '**normal'**.

The Recover List will list all your previous and current created arrays. Each entry will list the following properties:

- Array name
- RAID level
- Array Capacity
- Time created (YYYY/MM/DD, HH/MM/SS, 24 hr clock format)
- Location of physical drives
- Model of physical drives

Important: When recovering an array it is important to note the **location** and **model** of each physical drive because you can **only** recover using those **exact** positions and drive model.

How to Backup your Recover List

The recover list is a record of your previously created arrays containing the model and location information of your physical drives. Recovering from the list could help bring a **disabled** array back to **normal** status for emergency data retrieval.

To backup your recover list:

1. Log in to WebGUI
2. Click **Recover** Tab
3. Click **Backup to File**

Note: The file will be saved as **hptrec.rec**

How to Reload your Backup Recover List

In the case that you cleared the recover list or it does not appear for any reason, you can recover it if you saved the list beforehand.

To reload your recover list

1. Log in to WebGUI
2. Click **Recover** Tab
3. Under **Update Recover List** click **Browse**…
4. Locate your previously saved **hptrec.rec** file and select it
   Note: loading a back up recover list will completely replace the current recover list.
5. Click **Submit**

Event Tab

In the event tab, you can see log entries associated with the HighPoint device. The event log provides useful information when troubleshooting your set up.

In the event tab, there are four options available:

- Download – Save the log file on your computer
- Clear – Clears all log entries
- Prev – View previous log page
- Next – View next log page

Table 4. Event Log Icon Guide

Icon	Name	Definition
	Information	Includes general administrative tasks: • Create/delete arrays • Configuring spares • Rebuilding arrays • Configuring event notifications • Configuring maintenance

⚠	Warning	Alerts issued by the Host Adapter: • High temperatures • Sector errors • Communication errors • Verification errors
⛔	Error	Hardware related problems • Hard disk failure • Broken errors • Memory failure

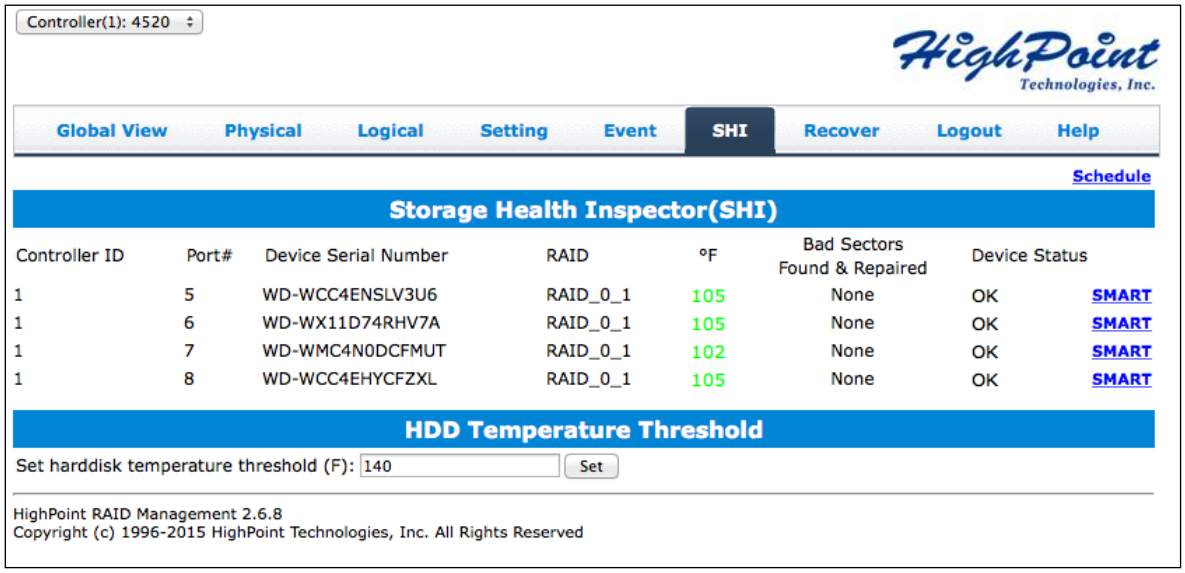
The event view is a basic error logging tool built into the HighPoint WebGUI.

SHI (Storage Health Inspector)

- S.M.A.R.T Attributes
- HDD Temperature Threshold
- Storage Health Inspector Scheduling

The SHI outputs information collected using SMART (Self-Monitoring Analysis and Reporting Technology) Hard Drive Technology. The data provided on this tab helps you to anticipate any disk failures based on a variety of monitored hard disk properties.

How to Enable SMART Monitoring



To access SMART attributes of an individual disk:

1. Log in to WebGUI (**default user**: RAID **password**: hpt)
2. Select the proper controller using the drop down menu on the top left
3. Click the **SHI** tab
4. Click **SMART** on the desired disk
5. Click **Enable** to enable SMART monitoring

Disabling SMART monitoring

You have the option the disable SMART monitoring on each individual disk.
To disable:

1. Select the proper controller using the drop down menu on the top left
2. Click the **SHI** tab
3. Click **SMART** on desired disk
4. Click **Disable**

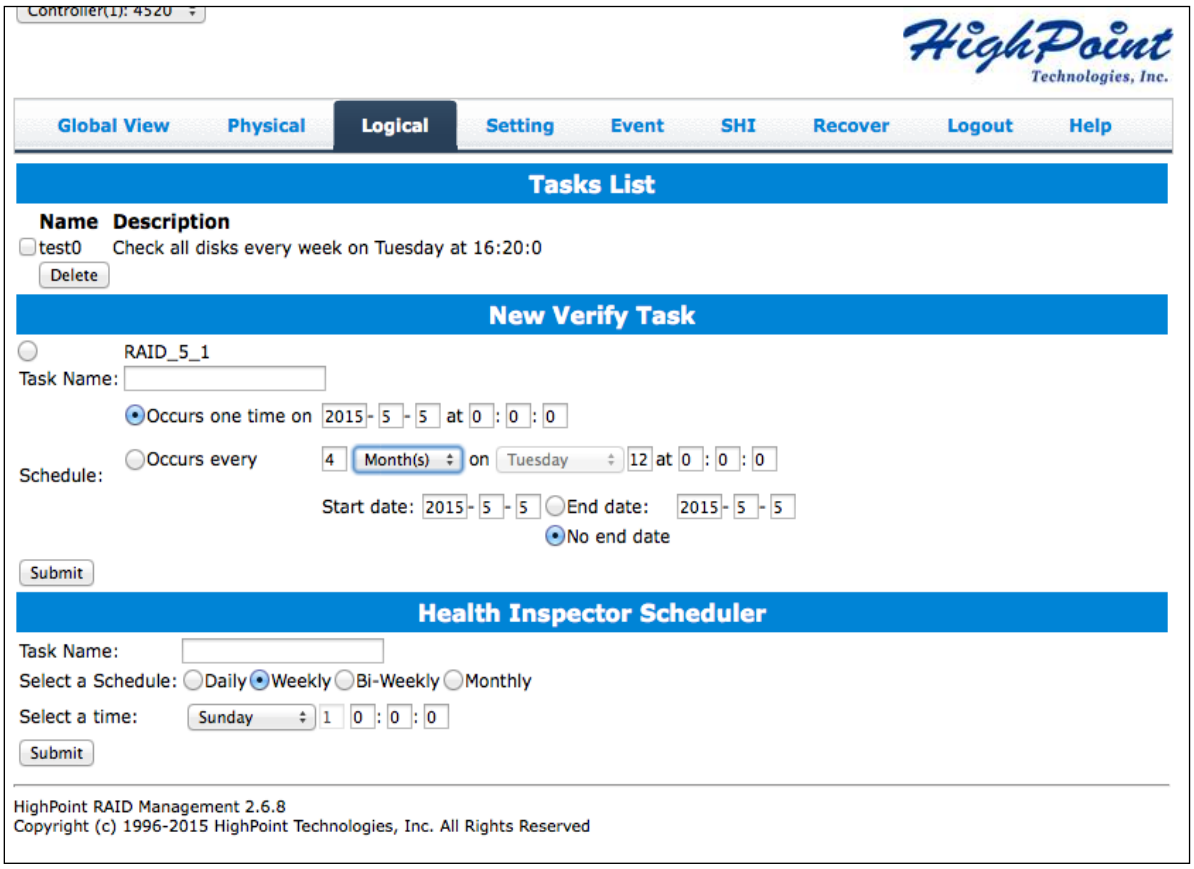
Note: Disabling SMART will prompt the Storage Health Inspector to change the disk status to 'Failed'. The alarm will **not** alert you when this setting is changed. And any potential warnings due to S.M.A.R.T attribute technology will not

How to Change HDD Temperature Threshold

To ensure hard disk temperatures remain cool, enable SMART to monitor disk temperatures. In **SHI**, you can set a threshold so that the WebGUI or controller alarm (if enabled) can warn you when physical disks get too hot.

1. Log in to WebGUI
2. Select the controller from the drop down on the top left
3. Click **SHI**
4. Type the desired harddisk temperature threshold (°*F*)
5. Click **Set**

How to Use the Health Inspector Scheduler



The **Health Inspector Scheduler** (**HIS**) enables you to schedule disk/array checkups to ensure disks/array are functioning optimally.

How to Create a New Verify Task

All arrays will appear under New Verify Task

1. Log in to WebGUI
2. Select the proper controller from the top left drop down
3. Click **SHI**
4. Click **Schedule**
5. Select the array you want to schedule the verify task
6. Type the name in **Task Name** entry box
7. Choose whether you want to schedule
   - One time verify task on specific date (YYYY-MM-DD) at (HH:MM:SS, 24-hr clock)
   - Or a specific schedule you can adjust based on Daily, Weekly, or Monthly options
8. Click **Submit**
9. Your entry will appear under **Tasks List**

Note: New Verify Task box only appears if you have normal status arrays. If you have a critical array, New Rebuild Task will replace New Verify Task.

Section 6: Formatting the RAID Volumes

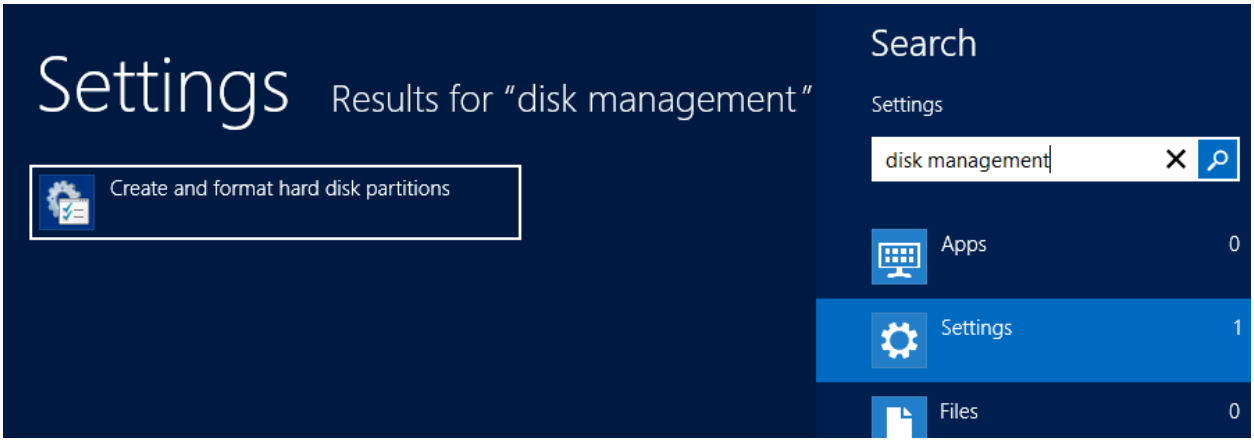
After creating a RAID array (see **page 43**), your operating system will recognize that array as a logical disk. But it will not be accessible until it is formatted by the operating system.

Format the volume when you have finished the following procedures:

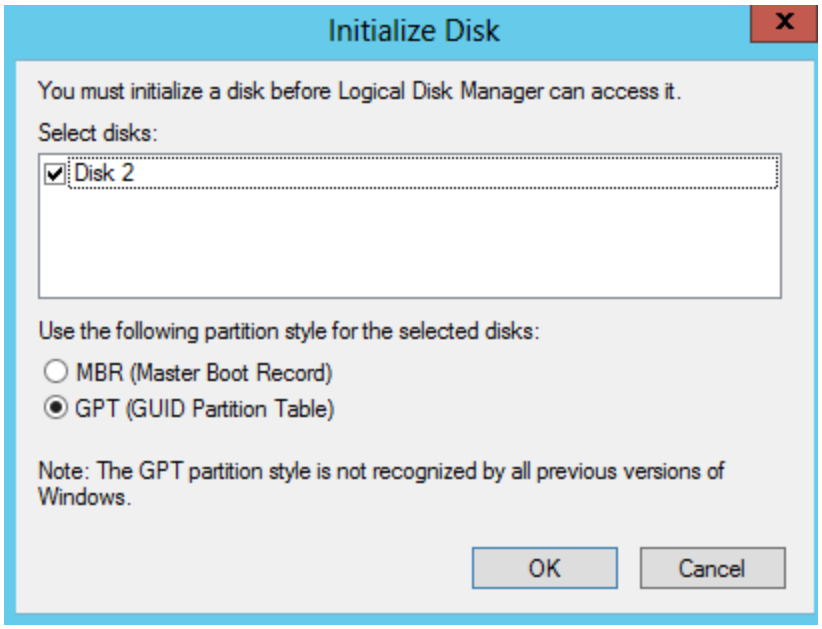
- Set up the Enclosure
- Set up the RAID Controller
- Installed Drivers
- Created an Array

For **Windows** Users:

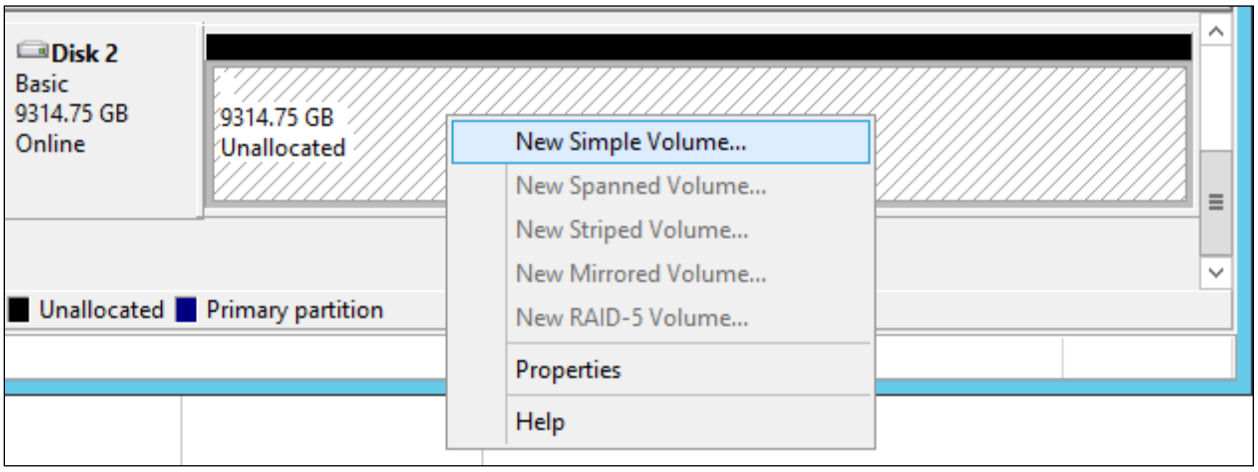
1. Use Windows Search Box and search **Disk Management. (**Search results may show **Create and format hard disk partitions**)



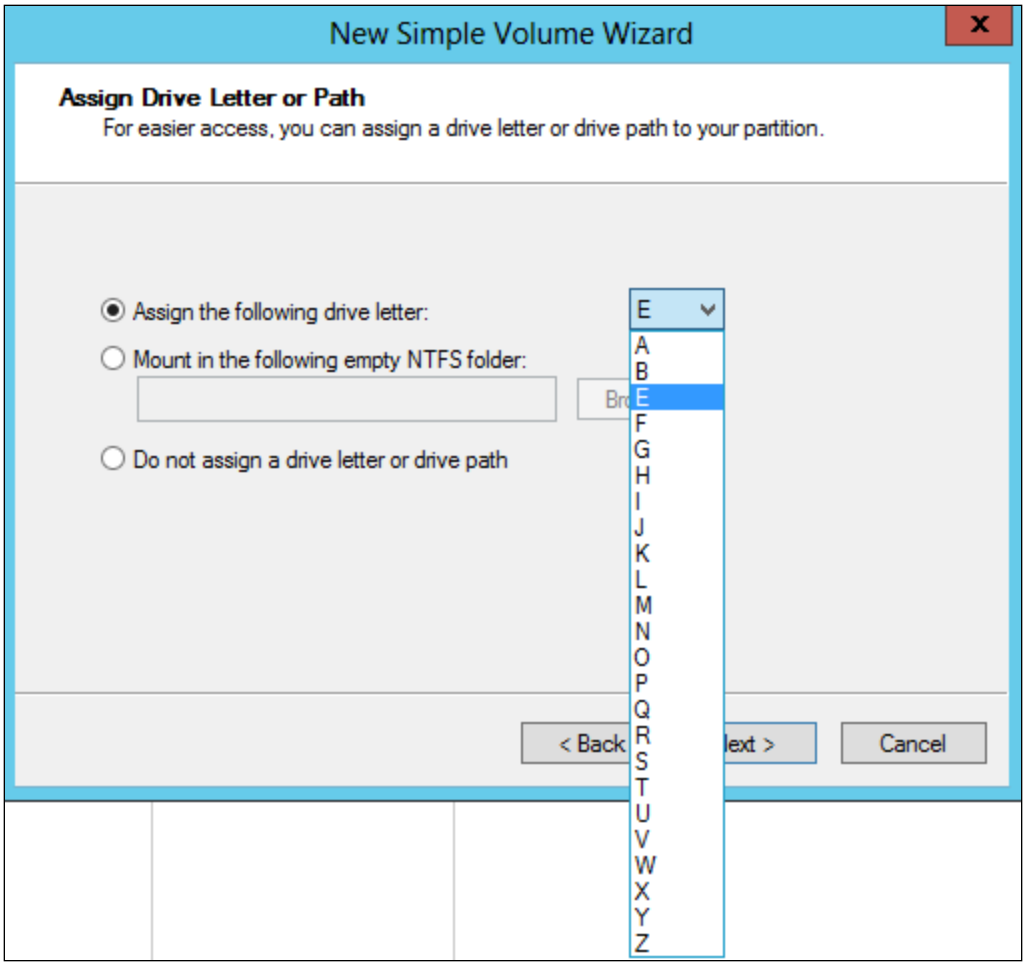
2. Alternatively, Go to **Control Panel**
3. Under Administrative Tools, click **Create and format hard disk partitions**
   - If you just created the array, a prompt will appear after clicking disk management asking you to initialize the disk
   - MBR partition table is mainly for bootable drives and has a 2 TB limit. If your PC motherboard uses legacy BIOS, you will most likely need to use MBR for bootable drives.
   - GPT partition table has no capacity limit, but cannot be bootable unless your PC motherboard contains UEFI firmware.


Initialize Disk
You must initialize a disk before Logical Disk Manager can access it.
Select disks:
Disk 2
Use the following partition style for the selected disks:
MBR (Master Boot Record)
GPT (GUID Partition Table)
Note: The GPT partition style is not recognized by all previous versions of Windows.
OK
Cancel

4. Once initialized, right click the unallocated disk space for your disk
5. click **New Simple Volume**



6. Follow the instructions on screen to receive a drive letter



7. Once finished, the drive will appear in your OS with the letter you assigned

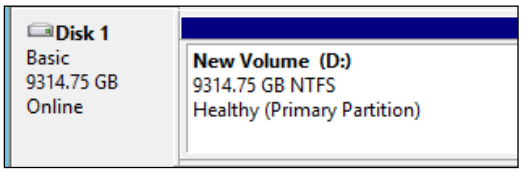
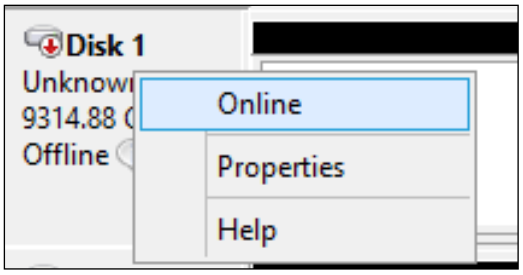


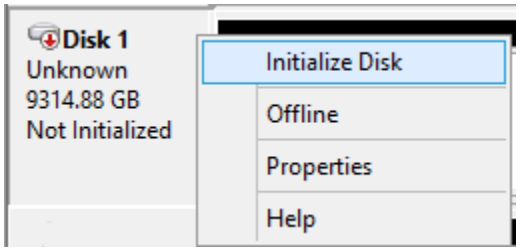
Figure 15. Disk formatted as NTFS and assigned drive letter D:

Your disk may initially appear offline to the operating system, and you may have to bring it online:

1. In Disk Management, right click the disk you wish to bring online.

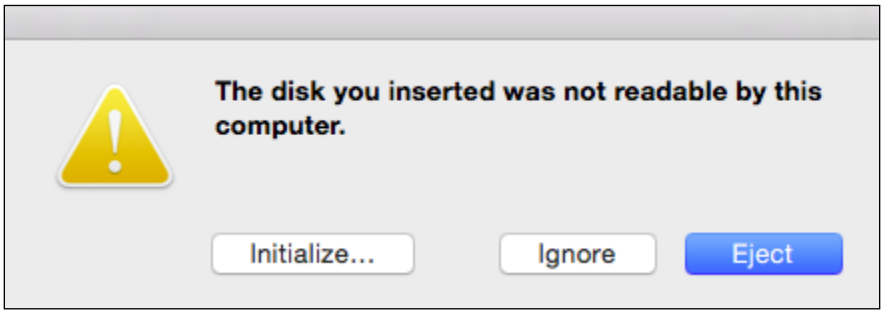


2. The disk status will change to Not Initialized; right click the disk again to initialize it.

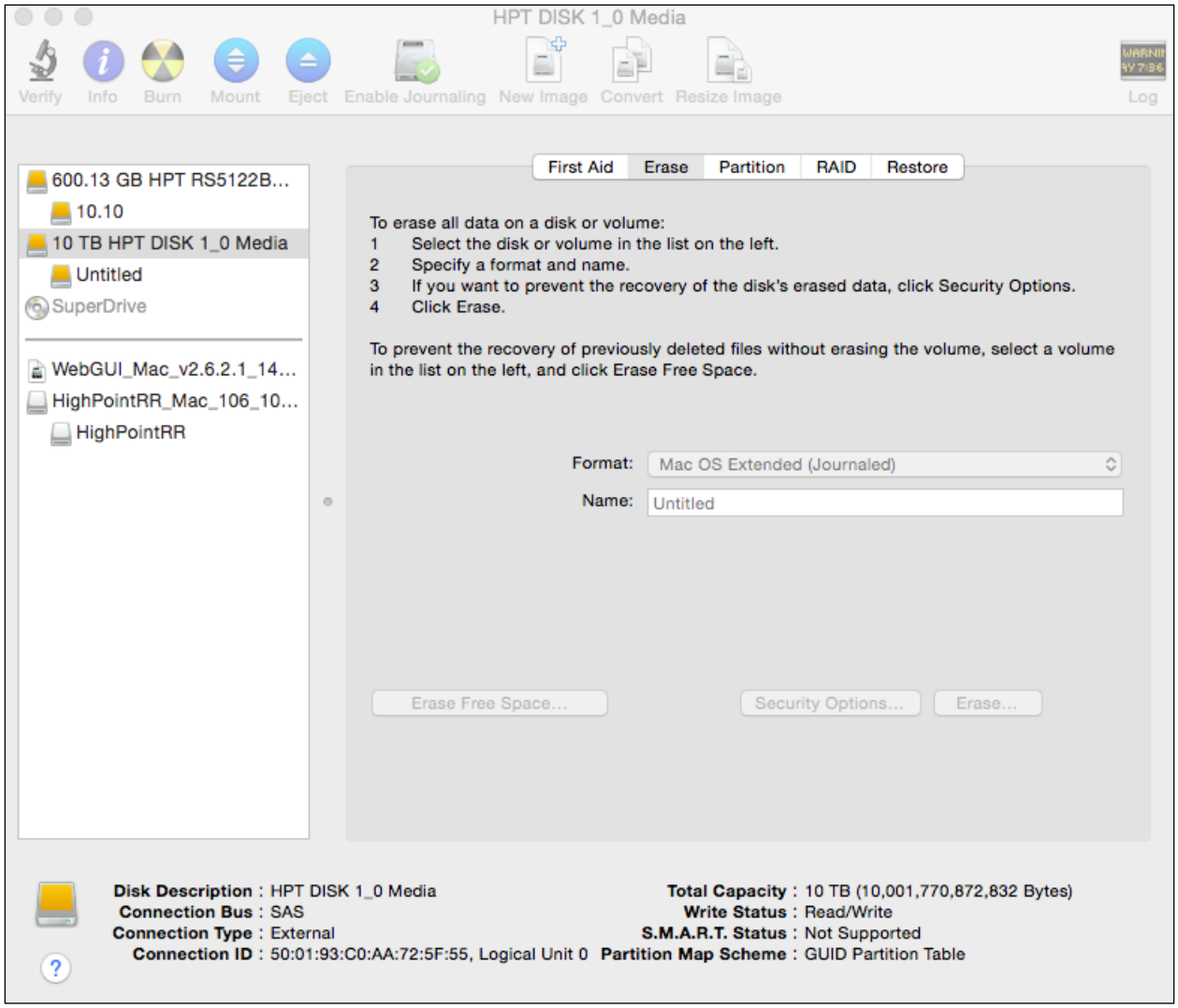


For **Mac** Users:

1. After creating an array using the WebGUI, you will be prompted to **initialize**.



2. Click **Initialize** (this will simply open **Disk Utility**)
3. Select your newly created array
4. Click **Erase**
5. Select a Format (recommended Mac OS Extended (Journaled))
6. Choose a **name** for your RAID volume
7. Click **Erase**...



8. The Volume will appear on your desktop

Section 7: Troubleshooting

This section provides guidelines to some problems you may encounter:

- Handling Critical Arrays
- Handling Disabled Arrays

- PC hangs when card is installed.

Handling Critical Arrays

When your disk status turns critical, that means your array as a whole is still accessible, but a disk or two is faulty (depending on your RAID level) is in danger of failing.

Common scenarios for critical status	• **Unplugging disk that is part of an array** • **Bad sector detected on a disk part of the array** • **Unrecoverable data during rebuilding** • **Defective port or cable interrupts rebuilding process**

To recover from this situation,

1. Backup your existing data.
2. Identify which disk is faulty.
   - You can refer to the LED lights on the enclosure
   - Refer to the WebGUI Logical tab and Event tab.
3. Re-insert the faulty disk or replace with a new disk.
   - Array will rebuild automatically if your auto-rebuild setting is enabled and you reseated the faulty disk. ***Note***: Click **Rescan** if array still does not rebuild automatically.
4. If the new disk is added and it does not automatically start rebuilding, you can manually add the disk in maintenance.
   - Log in to WebGUI
   - Click **Logical** Tab
   - Click **Maintenance** > **Add disk** > select the appropriate disk
5. Rebuild should now start.
   - If rebuild does not start, click 'Rescan' on the left hand panel.

Note: Rebuilding an array takes on average 2 hours per 1 Terabyte of disk capacity. The process will scan through the entire disk, even if you have very little *used* disk space.

Rebuilding Stops Due to Bad Sectors

If rebuilding fails to complete due to bad disk sector errors (check in the Event Log), there is an option to continue rebuilding on error in HighPoint WebGUI.

1. Log in to WebGUI

2. Click **Setting** tab
3. Under **System Setting**, change **Enable Continue Rebuilding on Error** to **Enabled**

This option will enable rebuilding to ignore bad sectors and attempt to make your data accessible. It is important to backup immediately after backup is complete and replace or repair the disks with bad sectors.

Critical array becomes disabled when you removed faulty disk

If this is the case, you may have removed the wrong disk. When you remove the wrong disk from a critical array, the array status may become disabled. Data is inaccessible for disabled arrays, follow these steps to restore the previous state.

1. Shut down your PC
2. Shut down the RS6422AS Enclosure
3. Place all disks back to original configuration
4. Boot up PC

Your array should be back to Critical status. Identify the correct disk and rebuild from there.

Handling Disabled Arrays

If two or more disks in your array go offline due to an error or physical disconnection your array will become **disabled**.

Disabled arrays are difficult to recover, so it is important to fix any critical status as soon as possible.

To recover a disabled array, using the 'Recover Tab' will yield the best results. To utilize the **Recover** tab, you will need to insert the **exact** physical drives that are listed under the *recover list*.

How to recover from a Disabled Array
1. Log in to WebGUI
2. Click **Maintenance** for the array that is disabled
3. Click **Recover**

Alternatively:

1. Log in to WebGUI
2. Click **Maintenance** for the array that is disabled
3. Click **delete**
4. Click **Recover** Tab
5. Select the RAID configuration you want to recover

6. Click **Recover Array**

Your PC hangs when card is installed

The moment you power on your PC the system BIOS will load and your PC will enter POST (Power On Self Test). If you hang at this screen it may be a system resources issue.

There are two methods to fix this problem.

1. Update your motherboard BIOS
2. Update your RAID Controller BIOS

Update your motherboard BIOS

To update your motherboard BIOS, refer to your motherboard manufacturer's user manual or website.

Update the RocketRAID 4522 BIOS

To update RocketRAID BIOS refer to either of these sections

- Using a Bootable USB to update BIOS
- Updating the BIOS through WebGUI **Note**: Press END to bypass the RocketRAID BIOS splash screen so you can boot up windows and access WebGUI.

Online Array Roaming

One of the features of all HighPoint RAID controllers is online array roaming. Information about the RAID configuration is stored on the physical drives. So if a card fails or you wish to switch cards, the RAID configuration data can still be read by another HighPoint card.

Help

- Online Help
- Register Product

Online Help redirects you to additional documentation concerning the HighPoint WebGUI.
Register Product takes you to HighPoint's web support. On this page you can create a new customer profile where you can register your product or post an online support ticket.

Table 5. WebGUI Icon Guide

	Critical – missing disk A disk is missing from the array bringing it to 'critical' status. The array is still accessible but another disk failure could result in data loss.
	Verifying The array is currently running a disk integrity check.
	Rebuilding The array is currently rebuilding meaning you replaced a failed disk or added a new disk to a 'critical' state array.
	Critical – rebuild required The array has all disks, but one disk requires rebuilding.
	Disabled The icon represents a disabled array, meaning more than one disk failed and the array is no longer accessible
	Initializing The array is initializing. The two types of initialization is Foreground and Background. (See Initialization)
	Uninitialized The array initialization process has been interrupted, and the process is incomplete.
	Not Initialized Disk is not initialized yet, and needs to be initialized before use
	OCE/ORLM Array is performing a OCE/ORLM operation
	OCE/ORLM has stopped The array expansion process has been stopped.
	Legacy An existing file system has been detected on the disk. These disk are classified as legacy drives.
	Spare The device is a spare drive, it will automatically replace any failed drive part of an array.
	Normal The array status is normal
	Initializing The array is initializing, either foreground or background initialization

	Initialization Stopped The initialization has been stopped. Current status is uninitialized.
	Critical – Inconsistency Data in the array is inconsistent and needs to be rebuilt.
	Critical – missing disk A disk has been removed or experienced failure, and user needs to reinsert disk or add a new disk.
	Rebuilding The array is currently rebuilding.
	Verifying The array is performing a data consistency check. Array status will show 'verifying'.
	Disabled The array does not have enough disks to maintain the RAID level. A disabled array is not accessible.
	OCE/ORLM Array is expanding its capacity or migrating to a different raid level. Status will display 'Expanding/Migrating'
	OCE/ORLM stopped The 'Expansion/Migrating' process has been stopped. The status will display 'Need Expanding/Migrating'
	Critical – OCE/ORLM A disk member is lost during the OCE/ORLM process.
	Critical – OCE/ORLM - rebuild The expanding/migrating array requires a rebuild.

Table 6. RAID Level Reference Guide

Type	Description	Min. disks	Usable space	Advantage	Disadvantage	Application
JBOD	Just a bunch of disk	1	100%	Each drive can be accessed as a single volume	No fault tolerance - failure of one drive results in complete data loss	Backup
RAID 0	Disk Striping	2	100%	Offers the highest performance	No fault tolerance – failure of one drive in the array results in complete data lose	Temporary file, performance driven application.
RAID 1	Disk Mirroring	2	50%	Provides convenient low-cost data redundancy for smaller systems and servers	Useable storage space is 50% of total available capacity. Can handle 1 disk failure.	Operating system, backup, and transaction database.
RAID 10	Disk Mirroring followed by stripe	4	50%	High read performance and medium write performance with data protection for up to 2-drive failures	Useable storage capacity equals total capacity of all drives in the array minus two	Fast database and application servers which need performance and data protection
RAID 5	Disk Striping with Rotating parity	3	67-94%	High read performance, and medium write performance with data protection with a single drive failure	Not recommended for database applications that require frequent/heavy write sessions. Can handle 1 disk failure.	Data archives, and ideal for application that require data protection
RAID 6	Disk Striping with dual rotating parity	4	50-88%	High read performance, and medium write performance with data protection in case of up to two drives failure	Not recommended for applications that require frequent/heavy write sessions.	Data archives and ideal for application that requires data protection

HighPoint Recommended List of Hard Drives

HighPoint maintains a list of tested hard drives suitable for RAID applications. Since not every hard drive in the market can be tested, this list is meant to be a general guideline for selecting hard drives operating in a RAID environment. Regular, desktop grade drives are highly not recommended for RAID use.

http://highpoint-tech.com/PDF/Compatibility_List/RocketRAID_600_2700_3600_and_4500_Series_RAID_HBA_Hard_Drive_Compatiblity_List.pdf

Contacting Technical Support

For any help and support, submit a support ticket online at http://www.highpoint-tech.com/websupport/ .

You may also call us during our regular business hours:
Monday – Friday (Excluding Holidays), 9 AM to 6 PM
Phone: (408) 240-6108